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A REMARKABLE RAILROAD ACCIDENT.

The train on the New York, New Haven, and Hartford Railroad which left Boston at 10:30 P.M. on Saturday, December 26 last, was partially wrecked at Pelhamville, a little station 16 miles from this city. The fireman was killed; the engineer and three of the seven mail clerks were seriously injured, while the passengers escaped with more or less severe bruises. The engine, tender, and mail car were thrown down the embankment, but the rest of the train remained on top, although entirely derailed, with the exception of the forward truck of the baggage car.

The accident is one of the most novel in the records of railroad disasters, owing to the causes leading to it, and the small loss of life, when we consider all the con-

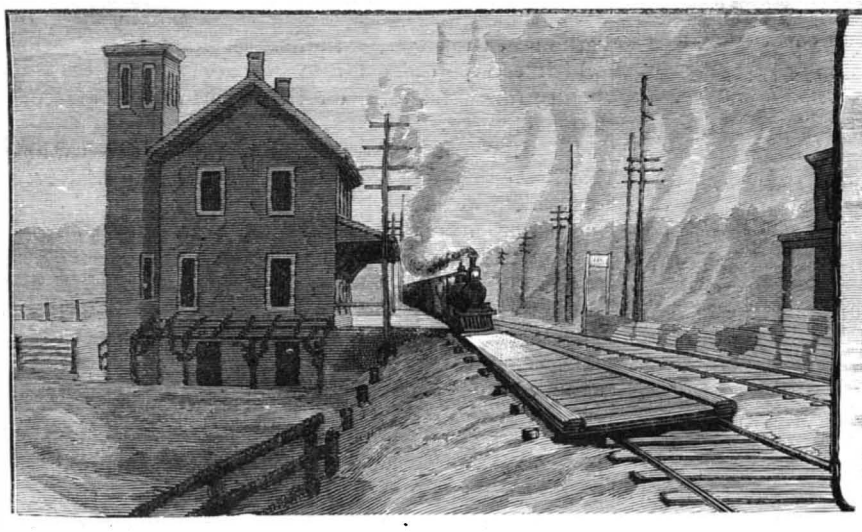

Fig. 1.—THE TRACK JUST BEFORE THE ACCIDENT.

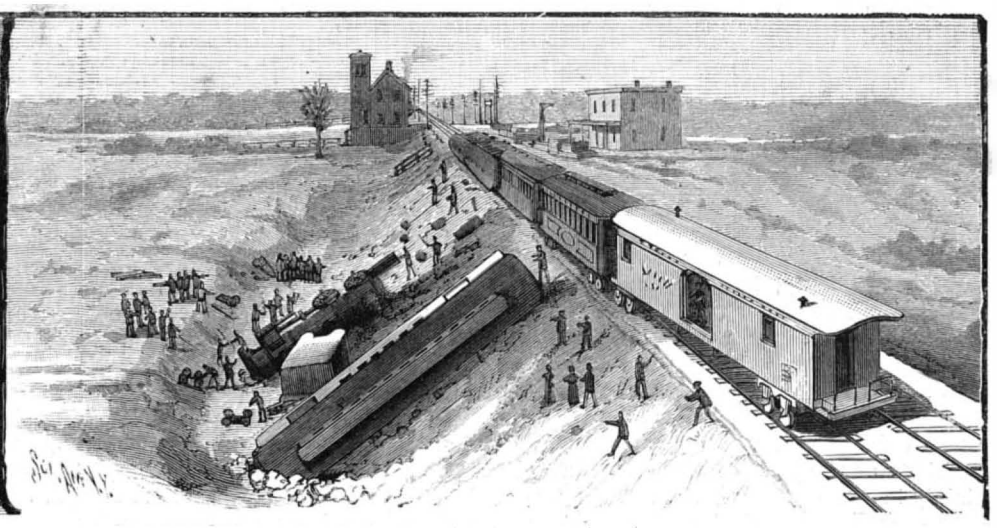

Fig. 2.—GENERAL VIEW OF THE WRECK.

Fig. 3.—REMARKABLE RAILROAD ACCIDENT.—VIEW OF THE LOCOMOTIVE AND TENDER.

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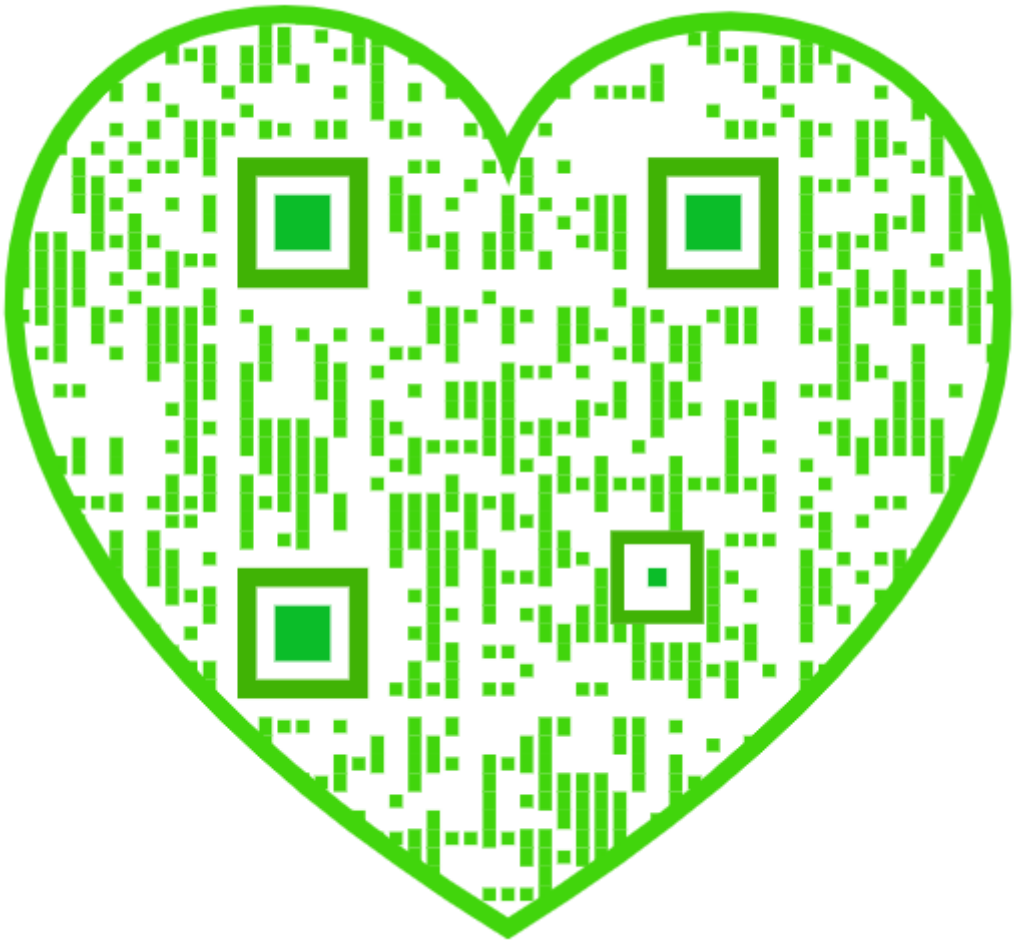

ditions. That an express train traveling at the rate of forty miles an hour should strike such an obstacle as this one did and yet escape total destruction borders upon the marvelous.

Running along the west track, which is the one used by incoming trains, on the north side of the Pelhamville depot, was a platform, 6 feet wide and 100 feet long, made up of thick boards laid crosswise upon two heavy stringers. One of the stringers rested on the ground by the side of the track, while the other rested on posts driven in the sloping side of the bank. These posts were about two feet out of the ground, in order to make the platform level. It appears that the stringers were not fastened in any way to the posts, and to this oversight the accident was directly due.

The contour of the country in the neighborhood of Pellhamville is such that when the wind is from the northwest it passes between two hills and sweeps down on the high embankment which crosses a creek below the station. Upon the night of the accident, the wind blew from the northwest with terrific force; it struck the slope of the embankment, and was deflected upward and beneath the platform, which it raised, turned completely over, and dropped upon the incoming track, as shown in Fig. 1. This structure of heavy timbers securely put together, 100 feet long, and wide enough to cover both rails, formed the obstruction struck by the train.

The locomotive splintered the platform, throwing large pieces a considerable distance each side of the track, and at about 300 feet from the station it tore the outer rail up, left the track, and rolled down the slope. The tender went further than the locomotive, while the mail car went further still, rolled part way down the slope, turned over, and stopped as shown in the second figure, which is a general view of the wreck immediately after the accident.

The condition of the engine and tender and their positions at the foot of the embankment are shown plainly in the large engraving. That the engine was not more thoroughly destroyed, after its rough treatment, proves the superior excellence of the material used and the skill attained by American locomotive builders. All things considered, it held together and reached the end of its short trip in a remarkably well preserved state.

That the baggage car, smoking car, Mann boudoir car, and the two sleepers did not leave the top of the hill, although derailed, is probably due solely to the fact that none of the couplings gave way. Had the connections broken, the results, lamentable enough as they were, would undoubtedly have been many times more serious. The two sleeping cars were turned partly over. The passengers of course escaped with only the bruises caused by the jolting of the cars when running over the ties.

The point most prominently and clearly brought forth by this accident is, that the effects of wind pressure should be provided for at every exposed section of a rail road. In high structures, such as viaducts and bridges, it enters of necessity into the problem. But in cases like the present, where there is no precedent, it receives little or no attention. Anything so near a road, and of such a character, that it might be possible for a high wind to blow it upon the track, should be made absolutely secure. The fact that this platform had withstood the gales of several winters is no excuse for leaving it unsecured to the posts upon which it rested.

Cheap Method of Heating Factories.

It frequently happens that chimneys are now built round, without corners to retard the draught. This is done by inserting in the chimney, as the building progresses, cores consisting of iron pipes cast in sections, or tile piping. Air spaces are thus left between the core of the chimney and the outer wall, and of course the air in this space becomes heated to a high temperature. It is quite practical to utilize this air for heating purposes, if this is found desirable. The air spaces being closed at the top, and openings being made to the open air at the base of the chimney, tin piping is connected with the spaces for conducting the heat to different parts of the factory. Of course, this method is not designed for heating the stories nearest the ground, as the current of air in ascending has not had sufficient exposure to become heated until it has reached the third or fourth story of the building.

Lieut. Greely Abroad.

Lieut. Greely, the celebrated Arctic explorer, lectured recently in London under the auspices of the Royal Geographical Society. He was enthusiastically received by a large audience, who seemed to feel as much pride in his achievement, as if he had been an Englishman. The Marquis of Lorne presided, and a number of people eminent in literary and scientific circles were among the audience. Sir George Nares pronounced a fitting eulogy upon Lieutenants Lockwood and Brainard, of the Greely expedition, who had succeeded in planting the stars and stripes farther north than had ever before been reached by man.

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MIND CURES.

Within the last comparatively few months, the possibility and practicability of curing diseases of all forms without the use of medicines or any other physical agencies have been pressed upon public attention with very great zeal and earnestness. There is nothing new in the idea; it is as old as the most ancient of all records, and has assumed various features in various ages, according to the environment. The present form is apparently the result, and a very natural one, of the importance which studies in psychology have been gradually assuming. At present, the idea of "mind cures" is the dominant one, which will doubtless live out its day and disappear; but it is worth while to consider briefly its claims, for it is surely doing no small amount of injury in many cases, some of them being those in which *remarkable cures* have been claimed. The stronghold of the "mind cure" as yet is in Boston.

It is quite manifest that the claims which are put forth depend for the *possibility* of their fulfillment on two things: 1. The actuality and potentiality of "thought transference"; and 2, the limit of the power which can be exerted by mental energy, not only on bodily functions, but on the living tissues and organic changes.

If the first point—"transference of thought"—cannot be thoroughly established, we have nothing whatever on which to base a belief that "mind cure" is any more than a delusion. The one who is to act the part of "healer" simply turns his own mental power and attention in upon himself, concentrating his energy upon the idea that the patient is free from disease. This he does while sitting by the patient's side, though it is claimed by some that it can be done without even coming into the patient's presence or entering his house. In proportion as his vital force, that is, his nerve force, becomes absorbed in this one thing, it is transferred to the mind of the patient, who is thus brought into physical relation with him, and is under his control to such a degree that what he believes, the patient necessarily believes. The patient thus believes that he is well, and, as the result, he is well, either immediately or speedily. This is the theory and the action, according to their own statements.

It is but fair to say that the evidence in favor of "mind transference" is exceedingly small. Very careful experiments have been made, both in Europe and in this country, and no fair-minded person can say that the proofs of transference of an idea from one mind to another without external agency go any further than what would be obtained from the doctrine of chances by means of accidental coincidence.

But now, in order to give every possible advantage to the advocates of "mind cures," let us admit for the occasion all that is claimed by any one of the reality and extent of thought transference, and see how far it can carry us. No one professes to deny that the influence of the mind over the sanitary condition of the body is exceedingly great, though it has in medical practice been sadly disregarded, in times past. We know well that in every form of disease the patient can be very largely benefited by those attendant circumstances which give tone and hopefulness to the mind, and specially by the efforts of his own will. We have no reason to question that in many instances the balance between life and death can be held and determined by the patient's actual will power.

We know also that multitudes of cases are daily occurring, involving very great exhaustion and distress, with not unfrequently most acute pain, in which the disease is purely and solely functional, that is, there is no organic change of any tissue, so far as we can ascertain. These patients, as a rule, are in no danger whatever, notwithstanding the frightful symptoms which they exhibit. Their case can terminate rapidly, and even instantly, in recovery, of which perfectly unnumbered instances can be given. Many who have been "bedridden" for years recover in this manner. And one point in addition ought to be mentioned—every possible symptom of organic disease is continually simulated by these functional forms so completely as to deceive the friends of the patient and not unfrequently the physician himself. These cases can be largely controlled by the mind; they are within the reach of the "mind cure."

In many of them, the machinery is in sufficiently good order for running; it lacks only *steam*. In them, a mind healer may make not only a complete cure, but one that is permanent. In others, the muscles have been so long without use that they have become sadly weakened; and while the stimulus of hope under the influence of the mind healer springs them into energy, so that the one who is fearfully crippled can and does move at will, thus putting on record another "cure," yet the reaction is as sure, though not quite so rapid. Within one, or perhaps two days, the new-found strength begins to sink away, and presently the patient has become much worse than before, and commonly is permanently injured, and hopelessly so, whereas different

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treatment might have made a slow but a steady and complete recovery. These cases are more common than those first mentioned.

The advocates of the "mind cure" claim, it is true, that the view here given does not represent the case fairly. They state continually that organic diseases are healed as promptly and as readily as those which are only functional. In regard to this, we must remember two things: First, that functional diseases, as already shown, simulate the organic completely, and are constantly mistaken for them; and that the practice of every physician shows him that their proportionate number is by many fold the greater. But the main difficulty is in the second point, which is that an instantaneous cure of a serious organic disease is *impossible* through any natural agency. This point, though sure and certain, is taken but seldom into the account.

An organic disease necessarily involves a change of tissue. There is in the affected organ an increase or a diminution of the natural tissue itself, or otherwise a tissue of distinct nature is substituted for it. Referring to one organ merely—the heart. It is laboring, we will say, with pericardiac effusion—"water on the heart"—and can continue in life and action only with a hard struggle. Even if the diseased pericardium could be instantaneously made perfectly sound, what could remove the fluid already present and choking out the life of the patient? It passes belief that any agent, either mental or physical, could cause it to disappear. The same difficulty exists as in every form of disease to which the valves are liable. To allow recovery, a physical removal or supply of tissue becomes necessary; and, as our minds are constituted, and in the present state of our knowledge, this is plainly to us an *impossibility.*

THE FISH TORPEDO AND ITS ENEMY.

In warlike Europe, the attention of the military authorities is constantly directed to the improvement of war ships, fortifications, and the torpedo service. Here, where we have neither modern fleets nor land works, the Government is very properly concentrating much of its attention upon the torpedo service, so that, even if we have no teeth to bite with, we may at least be prepared to resist attack of those who have.

At a time like this, however, when the demand for effective torpedoes has set ingenious mechanicians to work all over the world, and unique systems come so fast that the one almost treads upon the heels of the other, it would seem to be at least injudicious in the Government to decide upon the relative merits of and to adopt any particular system, because the next movement may bring forth a rival system to render the favored one ineffective and impotent.

The truth of this received only recently a striking illustration. No sooner did our Government decide to adopt the "Sims" fish torpedo, and give its order for a large number of these subtle missiles, than the news came of the successful trial in English waters of a torpedo catcher which, if only a part is true of what is promised for it, can render the "Sims" torpedo as impotent and harmless as a spiked gun.

This "Sims" torpedo, which, under the direction of the Engineer Corps, has been quietly undergoing examination and test for several years at Willet's Point, may be generally described as composed of two cylinders, the one wholly submerged, and containing a firing charge of explosives, and the other, connected with it by steel rods and intended to support its weight, having only its upper surface above the water line. It is directed and controlled from the shore by electrical transmitted energy through a wire which it reels off as it progresses.

The extent of its range is two miles, the operator ashore being enabled to observe its progress and maintain it in its course by keeping his eye fixed upon two balls poised upon steel rods that project perpendicularly out of its back. Numerous experiments show that this torpedo cannot be thwarted by the ordinary torpedo boom and other similar obstructions, it having shown its ability to dive under them and keep on its course unchecked and intact. Nor can the upper cylinder, the purpose of which, as may be imagined, is to buoy up the under one, be easily destroyed. Lieut.-Col. Abbott says that, in the tests, this surface cylinder has been riddled with shot, and yet the packed cotton within proved sufficiently buoyant to support the strain from below.

Tne "Sims" torpedo is indeed an admirable though scarcely a novel contrivance—the electrical apparatus being now in use in several old systems; and, were it not for the existence of the newly devised torpedo catcher and a few other things, might be looked upon to furnish an effective defense against the modern war ship. But, while the newly adopted torpedo can only make twelve knots an hour under the most favorable conditions of wind and tide, the torpedo catcher has a *mean* speed of 20·70 knots, and can make 23 knots per hour. In other words, the "catcher" is nearly twice as fast as the torpedo, and it would seem as if this "Sims" torpedo would have about as much chance with the "catcher" as a mouse has with a cat.

The projectors of the torpedo say that it can not only go under a boom laid to stop it, but can also blow up any ordinary obstruction and bring up still another torpedo which it has in tow to accomplish the real object of its mission.

But it is immediately apparent that, since it relies both for power and direction on electrical energy transmitted from the shore, the cutting of the wire which conducts the current would leave it to drift harmlessly about among the waves. So fast a craft as the torpedo catcher could overhaul it in short order, and would only have to drag a grappling iron across its wake to leave it *hors de combat.*

Again, the guns on a modern war ship have a range of nine and (the De Bange guns) even eleven miles, and need not come within two miles of the shore—which is its maximum range—to carry on their work of destruction. To be sure, the "Sims" torpedo may be operated from a ship as well as from the shore; but in that case, the ship would have to be of modern construction and heavily armed, and this would necessitate a recourse to great ships and great guns, the very thing this torpedo is supposed to be a substitute for.

It looks very much as if we had adopted the mouse as a protection against cats.

FIRE FROM STEAM PIPES.

It was asserted with confidence by the fire chiefs, at their fall convention at Long Branch, that steam pipes had been known to be the direct cause of a number of disastrous fires. The evil, in their estimation, was sufficiently grave to deserve attention from all municipal authorities. Experience in different parts of the country seemed to confirm their statement, with the one exception of Baltimore. In that city one of the commercial sheets has denied such an effect of steam heating, and questions whether a single authentic case of a fire, caused by steam pipes can be brought forward. This has naturally raised a controversy, in which one side asserts the existence of overwhelming proof, and the other ridicules their belief in such fables. It is usually hard to satisfy one's self of the real cause of a fire, since there are so many possible ones; but such evidence as we have seems to clearly indicate that steam pipes not only can, but have produced very serious conflagrations. When timber is brought in contact with hot pipes, and particularly in inclosed spaces, it becomes extremely dry, and finally charred. If air be suddenly admitted, such timber is very apt to burst into flames, its thorough dryness rendering it dangerously inflammable. Experiments conducted by Mr. Damrell, in which these conditions were present, gave just such a result. A state of affairs producible at will is possible by accident, and the same result must follow. In this case, the requisite conditions are very apt to be unintentionally fulfilled, for a steam pipe is ordinarily put out of sight whenever possible, and, to economize space, is permitted to come in contact with anything that may cross its path.

As far back as the early part of 1880, Mr. Edward Atkinson gave us a number of instances in which heated pipes were the direct cause of fire. Two or three of these cases may be recalled, as they are so much to the point. A steam pipe which ran across a yard, in a wooden box, was surrounded with fine charcoal, as being a good non-conductor of heat. Within twelve hours, the charcoal was in a state of vigorous combustion. At another time, a pipe carried through a sill in contact with the wood was sufficient to cause combustion within less than twelve months. Coming from so high an authority, this evidence has the weight of conviction, and can scarcely gain anything by being multiplied.

Improvement in the Treating of Fibers for Textiles.

Mr. Wesley W. Hamilton, of Brooklyn, N. Y., has recently obtained several patents in the United States and foreign countries for an improved process of treating animal and vegetable fibers, whereby many such substances heretofore unavailable may be made suitable for textiles, cordage, upholstering purposes, and numerous other uses. Jute and flax, when reduced in length to about that of cotton fiber, it has heretofore been found impossible to spin on cotton or wool machinery, either alone or when mixed with other short fibers. At the first part of our late civil war, it was especially sought to more largely utilize flax in England, by splitting up its fibers with acids and alkalies, to make them more nearly resemble cotton; but the flax fibers remained in the end only straight, solid pieces, destitute of the curliness, softness, and pliability characteristic of cotton. During the past fifty years, many patents have been taken out, here and in Europe, and especially in England, to make the short fibers of flax and jute capable of being spun, as can be done with cotton and wool; but they have all failed because of not imparting to the fibers the softness, pliability, and clinging, curly form always found in cotton and wool. By these inventions of Mr. Hamilton, it is claimed that all previous difficulties of this nature are obviated, not by the use of chemicals, which would impair the strength of the fiber, but simply by mechanical pressure and heat, in an operation which can be effected at very slight cost. Mr. Hamilton has been for several years engaged in perfecting his invention, which has not yet been employed in any manufacturing industry, but he has samples of a great variety of fibers thus treated, which show a wonderful transformation of what are usually considered the most intractable of fibers. Of calf, cattle, and goat hair, white and dyed, all his samples show decided woolly qualities, some of the calf hair being in a condition so it would take an expert to separate it from a fine sample of wool. Coarse and fine jute and flax, cut in lengths of one and two inches, are shown in a form very much like wool, and which undoubtedly admit of their being easily spun, either alone or with cotton or wool; while istle and cocoanut fiber, hog hair, and many other similar substances, are presented in a curled form, which adds largely to the variety of uses to which they may be applied.

PHOTOGRAPHIC NOTES.

Showing by Projection upon a Screen the Fixing of a Developed Gelatine Plate.—A member of the Society of Amateur Photographers of this city, Mr. J. J. Wilson, recently had occasion to deliver a lecture on the principles of photography before the Bowery Branch of the Young Men's Christian Association, and by a very simple and interesting experiment succeeded in showing to the large audience the appearance of a plate when developed, and also when in the process of fixing.

A special narrow tank was made, large enough to hold a plate 3¼ to 4¼, by clamping together two small sheets of glass, between which, around the three edges, was a strip of India-rubber packing, three-eighths of an inch thick, or square. This made a water-tight joint. The tank was then placed in the oxhydrogen lantern, taking the same position the usual lantern slide occupies, and was filled with the ordinary fresh hypo fixing solution.

A sensitive plate was exposed behind a negative (the exposure in this particular instance being made by the light of a burning match), and developed in a tray in the usual manner. Then it was washed and carefully placed in the hypo tank, reversed the same as a lantern slide. The powerful oxyhydrogen light was then turned on, but owing to the peculiar color of the film and its density, not a particle of light could be seen on the screen. But as the hypo gradually dissolved out the undeveloped portions of the film, the picture, which at first was faintly perceived, slowly grew more distinct and brighter, until it finally came out clear and plain, the moment the fixation was complete, to the surprise and pleasure of the observers.

The illustration was plainly seen upon the screen by every one, and gave a most excellent idea of the changes in the film during the process of fixing.

At Mr. F. C. Beach's suggestion, Mr. Wilson had previously tried to illustrate in the same manner the development of a plate, by putting in the tank an ordinary iron developer, and exposing and immersing a gelatino-chloride plate (noted for their extremely thin and transparent films), but found that the peculiar color of the film was such, notwithstanding its transparency, as to effectually cut off the yellow oxyhydrogen light, and thereby prevent the success of the experiment.

White Backing for Sensitive Plates.—It has been recently found by experiment that if a piece of white paper be interposed between the septum of a double plate holder and the glass plate, thereby forming a white backing, a greater amount of detail can be brought out in a plate which has had an instantaneous exposure than if the backing was left out. The theory of this is based on the ground that with the recently improved sensitive negative gelatino-bromide paper, it is easier to bring out the details in an instantaneously exposed picture than if the same were on glass. As the paper is white, it was supposed that a white backing upon a sensitive plate would have a similar effect. The experiment seems to prove that it does.

Advertising in Italy.

A convenient little advertising plan that comes from Italy is quite good enough to have been a Yankee conception. It is a railway ticket with pocket for an advertising card, and is in use on the North Italy Railway. The device is so simple, and withal so serviceable to both traveler and advertiser, that it is almost a wonder that none of our American inventors has contrived a similar arrangement. If one buys, for instance, a ticket from Milan to Venice, he finds inserted in the pocket a neatly printed sheet of paper giving all necessary information regarding the Venetian shops and hotels. Each advertisement sheet is divided into forty spaces, twenty on each side. The price of advertising in one of these spaces is fifteen francs, or about three dollars, for ten thousand copies. When all the spaces are occupied, the railway company thus makes an additional hundred and twenty dollars on each ten thousand tickets sold.

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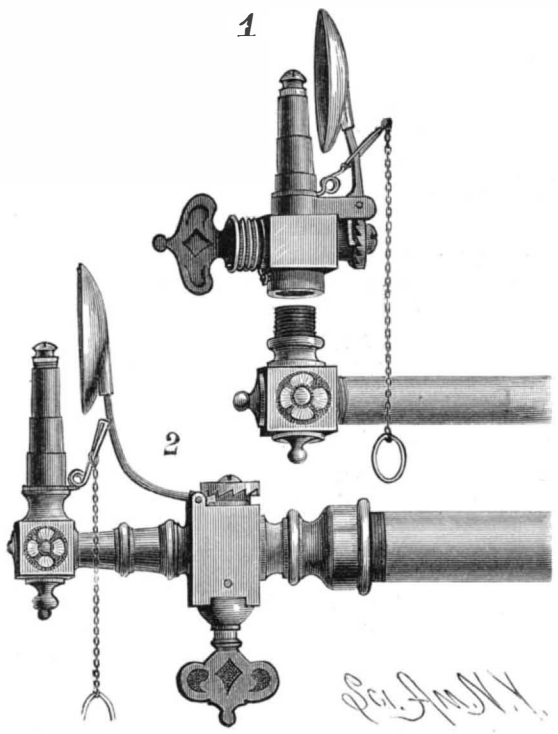
IMPROVED AUTOMATIC GAS BURNER.

The device herewith illustrated is designed to prevent all danger arising through the ignorance or carelessness of persons who blow out a gas jet. By means of a simple contrivance, which is reliable in its action and is operated by the force of the wind necessary to blow out the light, the cock is turned and the supply cut off. The engravings show the burner complete, and also show the improvement applied to an ordinary burner already in use. To open the cock for lighting the gas, the plug is turned in such a direction as to coil a spring secured to the plug and its box, when the plug is locked in place by the lower end of a curved lever engaging with ratchet teeth formed on the end of the plug. When a person blows out the gas, the wind is caught by the concave wing carried by the upper end of the lever, the lower end of which is moved to disengage it from the teeth, thereby permitting the spring to uncoil and turn the plug so as to shut off the gas. The plug may also be released when desired by pulling the chain, which is arranged as clearly shown in the cuts. As the plug has a number of teeth, it can be locked when partly or entirely opened.

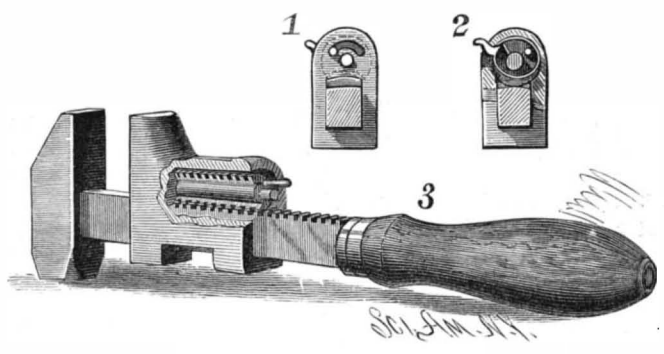


DOUTNEY'S IMPROVED AUTOMATIC GAS BURNER.

This invention has been patented by Mr. George Doutney, whose address is care of Doutney Bros., 439 Broadway, New York city.

IMPROVED WRENCH.

The shank of the wrench has a fixed jaw at its outer end, and is fitted with a sliding jaw, in the body of which, parallel with a shank, is a spindle pivoted in bearings at its ends. This spindle is threaded, so as to engage the rack teeth formed on the shank. At one side the threads of the spindle are removed, so that, when turned with the mutilated portion inward, the jaw can be moved easily on the shank. The spindle may be turned by a knob shown in the sectional view, Fig. 1, and also in Fig. 3. A semicircular spring is fitted in the jaw at one side of the spindle, and is provided with a catch at one end, which by engaging a notch on the spindle (Fig. 2) prevents its turning. To adjust the wrench, the end of the spring is pulled out and the spindle turned to bring its mutilated portion at the inside. The jaw can then be moved, and a partial turn of the spindle will cause its thread to engage the rack and lock the jaw in place.



GALE'S IMPROVED WRENCH.

This invention has been patented by Mr. Morgan Gale, whose address is care of American Consul, La Union, San Salvador, Central America.

IT is as much easier to find fault with what others do than it is to do something, as it is easier to ask than answer questions. In mechanical matters there is not much room for the man who can do nothing but object to the course of others. Fault finding, to some extent, is a negative virtue, but it ought to go along with a good deal that is positive.

Care of Pigeons.

Colonel Laussedat, in an address before the directors and keepers of the French military pigeon keepers, said:

"Cleanliness is an indispensable condition to the success of a pigeon crop. Each morning the keeper should remove the excrement from the shelves, perches, etc., using an iron scraper. He should also clear the ground with a rake, taking care to remove the feathers which accumulate in the corners and attract vermin, carefully leveling the sand which covers the floor. He should also, twice in the year, whitewash the walls and shelves, once near the close of October and again in April, in order to destroy the vermin as they begin breeding. I, however, prefer sprinkling them with petroleum, as easier to penetrate the crevices where vermin lodge. The feed bins should also receive attention, in order that the food for the birds should be kept dry and well ventilated, and thus not become heated. He should not hesitate to throw away musty grain rather than give it to the pigeons, as the maladies which result from such food would, in a very short time, depopulate the loft."

In Belgium the homing pigeons are fed on vetches and dried beans. This is undoubtedly the food best suited to the birds. They are given two meals a day, but a better plan is to place the food in a hopper, from which the birds can eat as they desire, because it sometimes happens that they will be forgotten, and in that case they will suffer from hunger and be retarded in growth. When the birds are feeding young, it is good to give them toward evening several handfuls of millet, of which they are very fond and will eat with avidity, and will feed to their young before going to roost. The lumps of salt for the loft must not be overlooked, as salt is indispensable to the bird's well being.

It is necessary to provide pure water, and never to allow it to become stale, or the fountains to be in an uncleanly condition. This is particularly applicable to the summer season, when water is more likely to absorb impurities which are detrimental to the health of the birds.

According to M. Megniere, impure water is the cause of the greater part of the maladies of pigeons. He recommends water impregnated with iron, and to clean the tanks or fountains every day.

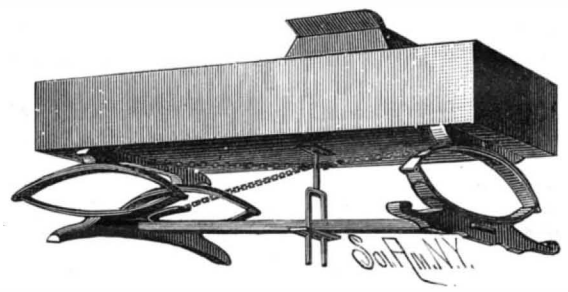
Carbonic Acid Gas Liquefied and Solidified.

At a recent meeting of the German "Verein zur Beforderung des Gewerbfleisses," some interesting details were given by one of the speakers as to the uses and the manufacture of liquefied carbon dioxide, which is becoming quite an extensive business. The idea of raising sunken vessels by means of carbon dioxide was spoken of, but it was stated that this notion had not been so far successfully carried out. It is well known that Krupp, at Essen, employs liquid carbon dioxide as a means of exercising great pressure on steel castings during solidification. Another use is that of removing the outer rings from condemned ordnance. Experiments were made at Essen by warming the entire gun, and then cooling the inner tube intensely and rapidly by means of liquid carbon dioxide.

Complete success was obtained, the inner tube contracting so much that the outer rings could be easily removed. It was mainly owing to the improvements in the method of manufacturing the liquid dioxide, which were worked out at Essen, that its systematic supply on a commercial scale has been developed, first by the firm of Kuhnheim & Co., of Berlin, and later by a company which has taken up their business. It is being largely used in the preparation of soda water, etc., and for pressing beer from the casks in the cellars to the taps where it is sold. At present the company are delivering eighty bottles per day of liquid dioxide, each bottle containing 8 kilogrammes, and costing 16 s. This daily manufacture is equivalent to 320,000 liters of gas. The bottles are of wrought iron, and are tested to 250 atmospheres pressure. Solid carbon dioxide is made by allowing liquid dioxide in a container to become gaseous and rush out through an outlet over which a porous bag is secured. A large portion of the gas escapes as such through the sides of the bag, but so much heat is absorbed that another portion solidifies, and is caught in the bag like snow. This can be made, by pressure, into a substance like chalk.

RUNNING GEAR FOR VEHICLES.

The object of this construction is to so stay the body supporting springs as to prevent their assuming a permanent forward or backward pitching or set, and to cause them to remain upright for more easy and effective action, irrespective of the load on the vehicle. The top of a metal rod guide, or frame is fastened to the wagon bed, and the forked rods slide in a plate fixed to the reach of the running gear. Attached to the stem of the guide is a chain, secured at its opposite end to the forward bed block by a screw bolt and nut. At the other side of the stem are fastened the ends of two chains, one of which is attached to the rear bed block and the other to the free end of a spring secured to the reach. These chains hold the springs at all times in proper relation with each other and with the wagon bed; and as the guide is free to rise and fall with the wagon bed and upper sections of the springs, the chains always have the same effect, no matter how light or heavy the load may be. Should the wheels run over an obstruction, so as to throw a sudden lengthwise strain upon the running gear, the spring to which the rear end of the lower chain is fixed would yield as the upper sections of the wagon springs are thrown forward with the bed; and when the wagon passes the obstruction, the spring will react, and draw the bed, springs, and their stay chains back to normal position. This chain and spring also form an elastic connection between the upper and lower parts of the running gear.

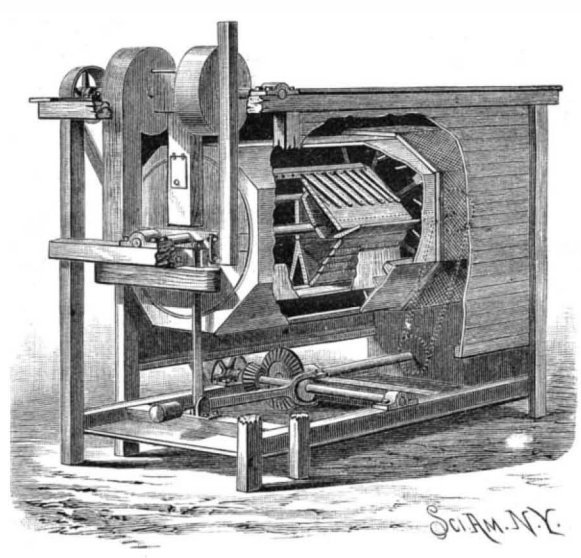


RUNNING GEAR FOR VEHICLES.

This invention has been patented by Messrs. R. Wiehle, W. Lorey, Jr., and Christian Feuchter; further particulars can be had by addressing the latter at Ironton, O.

AN IMPROVED MIDDLINGS PURIFIER.

Since the general introduction of roller mills for the production of fine grades of flour, within the past 25 or 30 years, all parts of milling machinery have been in a rapid state of advancement in the line of making closer separation of the products of each different operation, and doing the work more perfectly and economically than was cared for, or even possible, under the old system. In this direction lies the special significance of the patents herewith illustrated, which are for certain improvements on a patent granted to the same inventor in 1882. The illustration shows so well the operation of the machine that but little need be said to explain its details. The middlings are fed through the chute coming down by the blowers, so that they drop upon the elevator drum; and as the drum revolves the middlings are raised and drop upon the peaked top, sliding down upon the riffles of the same upon the wing of a vibrating section, which is reciprocated to make very short and rapid strokes. The middlings then slide over ribs forming partitions arranged like steps, so that they drop vertically at each slot a very short distance. Air is forced into the box by one blower, and the other operates as an exhaust, but the working may be nicely regulated, so that the lighter particles will be carried through a particular chute to a suitable receptacle, while the coarser ones are passed into the screen shown at the right, where they are screened and carried off in their appropriate chute. The partitions through which the lighter particles are passed out may be regulated as desired, as also can be the air blast and suction, and the inclination of the ribs or riffles, according to the speed at which it is deemed best to pass the middlings through, giving the mill operator complete control over the machine, and enabling him to work each particular lot as may seem best at the time.



KLOSTERMANN'S MIDDLINGS PURIFIER.

This invention is the subject of two patents recently issued to Mr. William Klostermann, of Young America, Minn.

MR. ERICSSON, the distinguished inventor, has received the Grand Cross of the Order of Naval Merit, recently conferred on him by the King of Spain. It comes to him through the Secretary of State.

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The Ericsson Gun.

The *Naval and Military Gazette* gives an account of the arrival at the Royal Woolwich Arsenal of Captain Ericsson's new steel gun, intended for firing projectiles and torpedoes under water. It now lies at the inspection branch of the Royal Gun Factories, from whence, after some preliminary tests, it will be sent on board ship, probably at Portsmouth, for trial at sea. No less than forty tons of steel are used in the construction of the gun, which is 30 feet long and has a bore of 16⅛ inches.

It is a breechloader, and closes at the breech by an arrangement of a very simple and effective character. The vent, which is axial, is sealed, and said to be effectual in preventing the escape of powder gases. The projectile measures 25 ft., which is only 5 ft. less than the gun, and is gauged to pass freely along the bore, which is unrifled.

It is hollow, and, notwithstanding its great length, weighs only one ton. The proposal is to fit the gun in the bow of a ship, 9 feet under the water line, so as to fire straight ahead from the cutwater. A diaphragm of India rubber is fixed over the muzzle to exclude the water, but is blown away at the first puff of the discharge. A charge of 20 pounds of powder is all that is thought necessary for propulsion, and this being placed behind the projectile, the breech is closed, and the gun is ready for firing.

It is asserted that a range of 300 yards under water may be relied on, but it is considered doubtful whether the shot can overcome the resistance of the water and retain an effective striking power for half the distance. The inventor, however, has tried his device, and he says he ought to know.

To preserve the lateral position and uniform depth of his submarine missile, he has weighted it to the gravity of water, and, while he keeps one side under by the preponderance of weight, he has a steering plate on the upper side which opens only after leaving the mouth of the gun, and acts as a rudder in keeping the projectile in its course.

The Fossil Wood of the West.

An interesting paper has been communicated to one of the California scientific societies on the fossil wood which is found in different localities throughout the State.

This silicified wood is stated to be a variety of quartz; the wood fiber is gradually replaced by quartz, leaving the form of the wood intact, so much so that sections cut and placed under a microscope show the characteristic grain of the wood, by which the genera may often be determined, and sometimes the species. In what is known as the petrified forest in Colorado, where are stumps of trees several feet in height and some twelve or fifteen feet in diameter, one stump seemed to have been fossilized while in a charred state, and from it fossil charcoal was obtained. Many of the specimens of wood are encrusted with layers of crystallized chalcedony of an opalescent tint, so beautiful that sections have been mounted and worn as jewelry. In Wyoming there have been found sections of trees 20 inches in diameter and several feet in length, like hollow tubes, with the interior surface entirely studded with pure quartz crystals, presenting a most beautiful appearance.

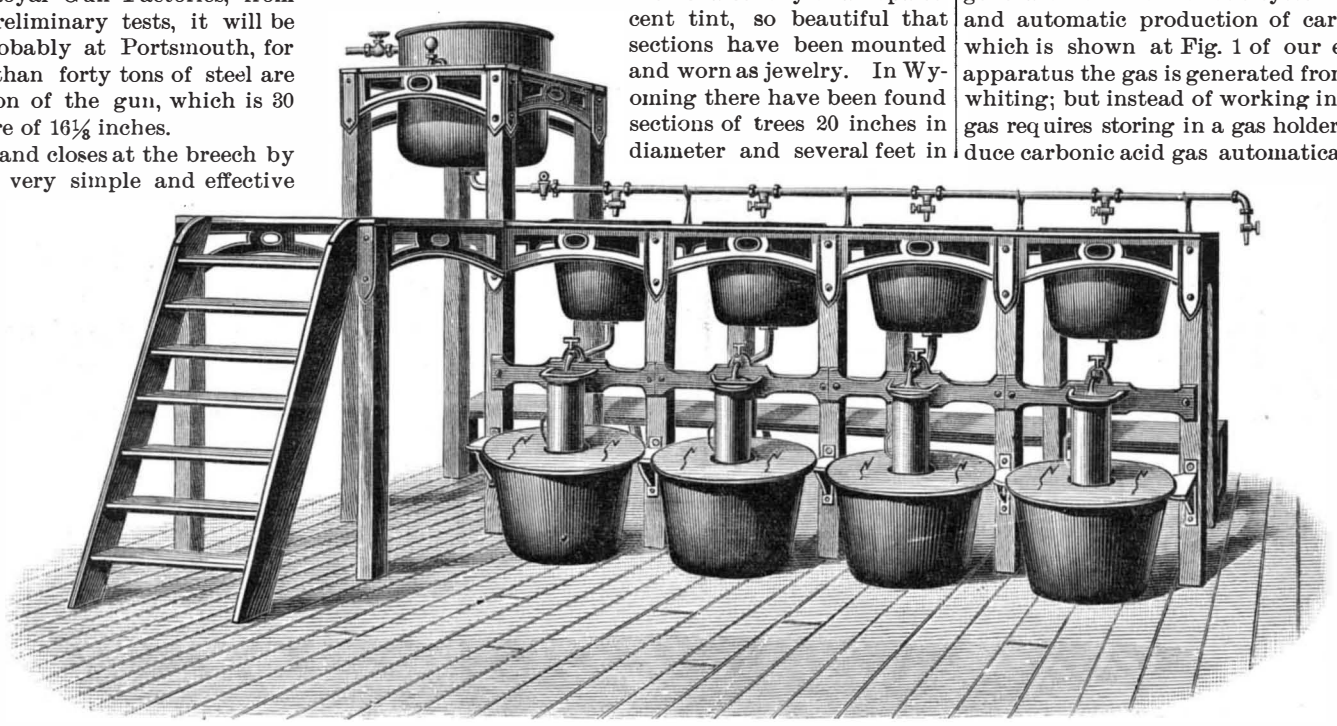

Fig. 2.—AERATED WATER MACHINERY AND AUXILIARY APPARATUS.

Earth in the Stable.

Nothing will purify and keep a stable so free from odors as the free use of dry earth, and every one keeping horses or cattle will find it pays to keep a heap of it at hand, to be used daily. A few shovelfuls of earth scattered over the floor after cleaning will render the air of the apartments pure and wholesome. The value of the season's manure pile may be largely increased by the free use of such absorbents. The strength of the gases and liquids absorbed is retained, and is the very essence of good manure.

AERATED WATER MACHINERY AND AUXILIARY APPARATUS.

The late brewing exhibition in London has introduced us to some more of Mr. Favarger's specialties, which we illustrate. These consist, first, of a double generator on Mondollot's system for the continuous and automatic production of carbonic acid gas, and which is shown at Fig. 1 of our engravings. In this apparatus the gas is generated from carbonic acid and whiting; but instead of working in such a way that the gas requires storing in a gas holder, the generators produce carbonic acid gas automatically, without the aid of a gasholder, and in exactly the quantity required by pumps of any description, that may be working from them. The machine consists of two separate and distinct generators, each one made to work independently of the other, but yet both connected by the same pipe to the pumps. This arrangement enables the generators to be worked alternately, so as to give time to renew the materials in each as they become exhausted. This plan has the advantage of preventing a stoppage of the works, even though one of the generators should meet with some unforeseen accident, for the other would always be ready.

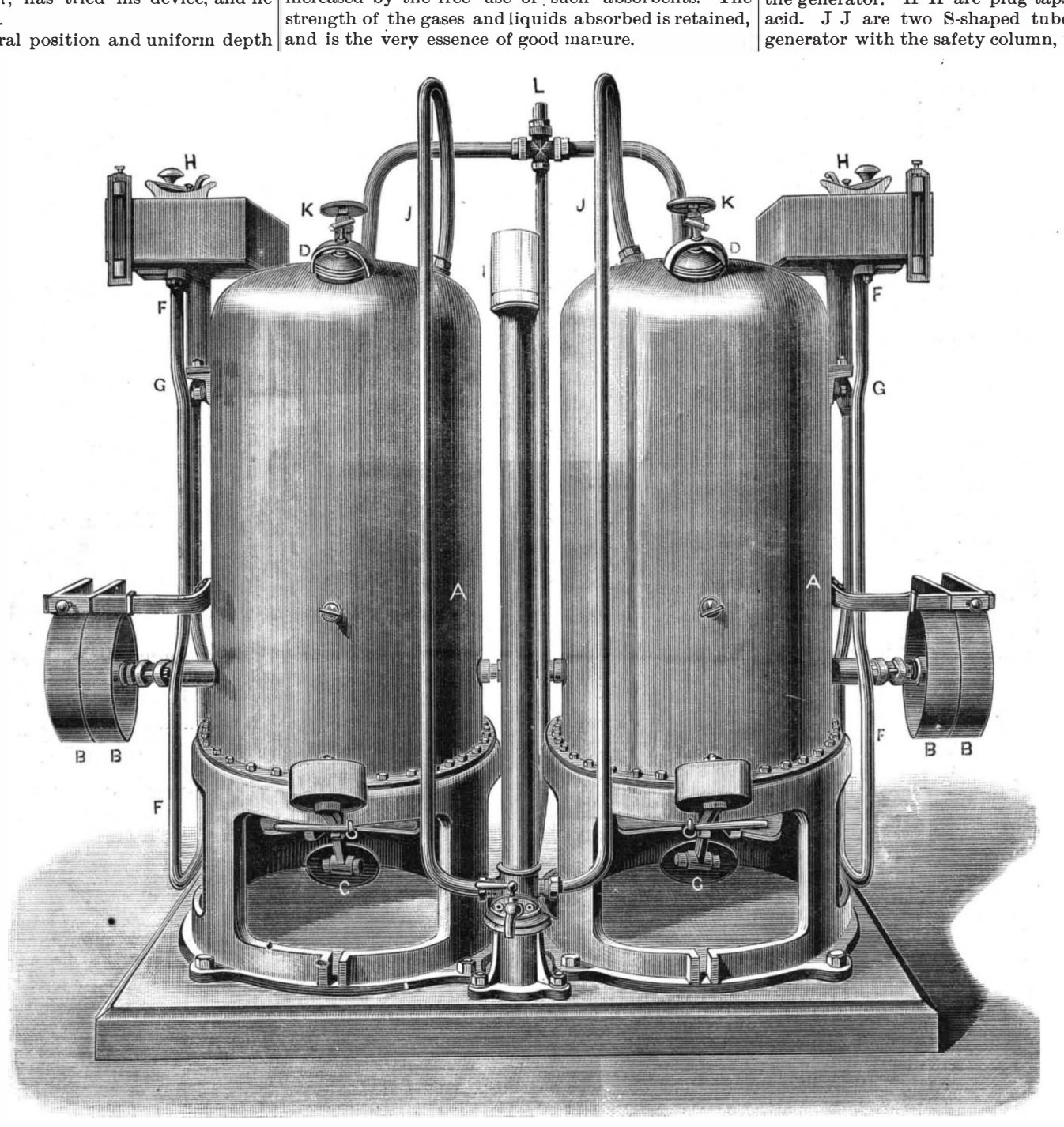

Fig. 1.—AERATED WATER MACHINERY AND AUXILIARY APPARATUS.

In Fig. 1, A A are the generators, which are made of copper and lined with lead. B B are fast and loose pulleys that drive screw-shaped fans inside the generator. C C are sluice valves for emptying the materials. D D are manholes for putting in the whiting. E E are leaden boxes containing sulphuric acid, which flows down the loops, F F, and by spouts, at G G, into the generator. H H are plug taps to stop the flow of acid. J J are two S-shaped tubes connecting each generator with the safety column, with the open glass top, I. K K are taps which command the pipes, L L, leading to the purifiers, and thence to the pump.

In operating with this machine a given weight of whiting and a given quantity of water are introduced through the opening, D. The box, E, is filled with sulphuric acid, which flows down the loop, H H, and into the generator by the spout at G. While the cap is still off the manhole, D, the fans are put in motion, and the acid tap, H, is opened. The acid then flows in freely, and, coming in contact with the whiting, creates carbonic acid gas, which drives the air out through the opening, D. When the air is quite blown out, the tap, H, is shut, and the cap put on the opening, D. As soon as this opening is securely screwed up, the tap, H, is opened, but no generation of gas will take place, for a curious action here occurs. As the first drop of acid

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falls from the spout, at G, and reaches the whiting, it creates a volume of carbonic acid gas. The gas tries to get away, but its only way of exit is down the very pipe, F, through which the sulphuric acid has just been admitted, so that it makes a back pressure, and keeps the acid in check. The L tap is then opened, and the pumps are set in motion. As soon as they draw the gas away from the generator, the slight pressure is diminished, and room made for another drop of acid to fall on the whiting, This, again, makes back pressure, and keeps out the sulphuric acid until the next stroke of the pump, when again it flows. This flow and checking of the acid takes place as long as the pumps are in motion. As soon as they stop, the last drop of acid makes a slight pressure, and the acid is again checked, without closing the acid tap.

The action of the safety valve, I, is clear and its action simple. If the pressure in the generator gets too high, it blows off the water; and if the pumps drawing from the generator make a vacuum, the water is drawn in, clearly showing the operator that something must be wrong. In practice, the water in the safety valve only varies about an inch in height, proving how perfect and accurate is the working of the generator. When the materials are exhausted, which is seen by the level of the acid in the box getting low, the other generator is set in motion, and the spent one emptied and refilled ready for use. Thus far the machine appeals to manufacturers as being perfect in principle and in action, but its more substantial point is that, owing to its making good use of every particle of sulphuric acid, it effects an important economy of material, which has been certified to by users of these machines. The second specialty we have to notice is Mr. Favarger's new sirup plant, which is shown at Fig. 2 of our engravings.

FIG. 3.

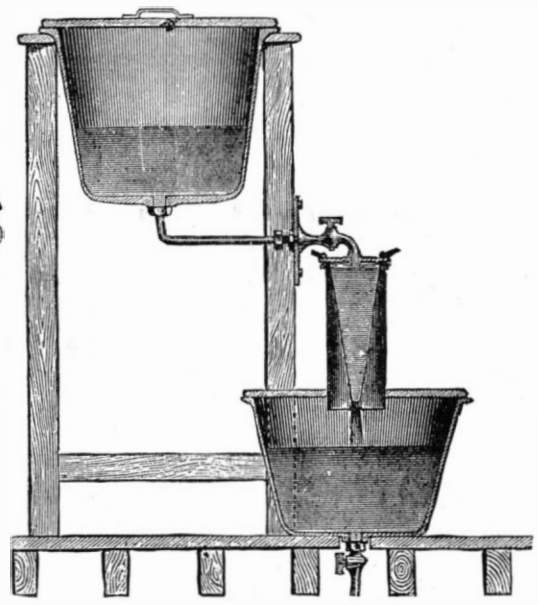

FIG. 4.

AERATED WATER MACHINERY AND AUXILIARY APPARATUS.

The apparatus consists of a timber and iron framework, which supports a steam jacketed pan and a series of enameled iron coolers. The cavity pan is reached by a platform and steps; and the sugar, after being boiled in it, is conveyed to the coolers by a large tube. There it is flavored, and then run through Mr. Favarger's filters to the coolers below, thence being carried by tin pipes to the bottling machines underneath. In the filter—which, owing to the rapidity of its action, Mr. Favarger has given the name of the "Lightning"—the usual filter bag is used, but, by an ingenious arrangement, the weight of the sirup to be filtered is utilized to get additional pressure, and so to facilitate and improve the filtration. Fig. 3 is an outside view of the filter, while Fig. 4 shows it attached to an upper cooler.

The filter bag is attached to a ring at the top of a tinned copper tube, which is connected to the cooler as shown. The filter bag is secured by a clamp between the cover and the tube, so as to make a water-tight joint, and thus, when the sirup is allowed to flow from the upper vessel, the whole of the weight of the liquid is brought to bear on the filter bag, and thus gives perfect filtration. The great advantage of this simple contrivance is not only that it gives very rapid filtration, but that it enables the operator to mix with the sirup charcoal, magnesia, or any other substance, and thus pass the liquid through a layer of filtering medium that would absolutely stop it if any ordinary filter bag were used. The sirup is not exposed to the air during or after filtration, and is thus protected from impurities. In addition, it does not come in contact with the metallic portions of the filter.—*Iron.*

Manual Surgery for Pianoforte Players.

The method of liberating the ring finger of musicians by dividing the accessory tendons of the extensor communis digitorum muscle, as described in our issue of August 8, 1885, is attracting increasing attention. The weakness of the third or ring finger is due to two accessory tendons connecting its motive muscle with those of the second and little fingers.

In consequence of this connection, the ring finger is incapable of free and independent motion. Every one has probably noticed his own inability to raise his ring finger any distance above the plane of the hand when the neighboring digits are not similarly elevated, and, if a musician, has found it a great inconvenience. Occasionally these tendons are found to be present only in one hand, which is usually the right, and in rare cases they are entirely absent. The restriction which they impose upon the motion of the ring finger can be somewhat lessened by incessant practice, but can never be entirely overcome. It is a continual disadvantage, both in music and in other arts.

To free the ring finger by dividing the binding tendons is not a new suggestion, but it has only been during the past year that the operation has come into any prominence. Dr. Wm. S. Forbes, of Philadelphia, has given the subject particular attention. The operation, as practiced by him, is very simple, but should only be undertaken by one well acquainted with the anatomy of the hand. A narrow, pointed bistoury is inserted into an incision less than one-sixteenth of an inch in length made through the skin and fascia, just below the carpal articulation of the metacarpal bone of the third finger, and above the radial accessory tendon of the hand, parallel with the extensor muscle. The blade of the bistoury is kept horizontal, and the handle is somewhat depressed. In this position the blade is moved beneath the accessory tendon, and so far down the hand as to be a little above and between the knuckles of the third and middle fingers. The instrument is now turned with its edge toward the skin. The middle finger being strongly flexed, and the accessory tendon made taut by extending the ring finger, a gentle sawing motion of the blade severs the tendon at once. The bistoury is turned flat again, and withdrawn through the incision. The tendon on the opposite side of the extensor muscle, that is, between the third and little fingers, is divided in a similar manner.

As stated before, not a quarter of a drachm of blood is spent by the operation. Each incision is covered by a piece of adhesive plaster, and a figure-of-eight bandage carried around the wrist and hand. Two days after the operation, the patient is required to exercise on the piano in order to prevent the tendons from reuniting. A slight swelling remains for perhaps a week, at the end of which time the liberation is complete, and the ring finger can be elevated an inch further above the plane of the hand. Dr. Forbes writes us that up to December 15, 1885, he had performed the operation upon fifty-two patients, and that in all cases the result was perfectly satisfactory.

The operation has raised a great deal of opposition among more conservative musicians, who maintain that partial freedom bought by years of constant exercise is preferable to perfect liberation gained by a few minutes' surgery. Others, again, contend that the method is unnatural, and tends to interfere with the designs of Creation. But this is an objection which we need scarcely argue. Such a question should give rise to no partisanship. If the method be good, it should be accepted. If it does not prove efficient, the suggestion has done no injury. The favorable experience of so large a number of patients is certainly a strong argument in its favor. All of these people testify that the freedom resulting from the operation is most gratifying, and that they have experienced no loss of power in any other direction.

The discussion has also been taken up with much interest on the other side of the water. One of the most celebrated English surgeons, Dr. Noble Smith, has repeated the operation with perfectly satisfactory results. He recommends, however, that it be performed only by an experienced operator, and in cases where the accessory tendons are well defined. He regards the risks of the operation as infinitesimal, but very properly adds that the patient should, nevertheless, be warned that no wound can be made without some danger.

In the Long Evenings.

True independence consists in the possession and improvement of resources within one's own self. There is a sense in which *self-sufficiency* is a laudable trait of character. It is far different from self-assertion, which may be Ishmaelitish, turning the hand against every man. And it is just as far removed from that weak dependence upon others which leads one to look for aid at all times, and for constant society and companionship in occupation and in amusement. Social intercourse and conversation are a part, and a very large part, of all our lives. Both improvement and pleasure depend upon our well-selected friendships. Still, he is a poor companion for others who can do nothing for himself. He who has nothing in him has nothing to impart to his friends. He has no capital to go upon in the social exchange which promotes the intelligent life of man.

The long winter evenings are now at hand. The caterers for amusement are preparing their bills of fare. The attractions of society are presenting themselves, and plans are everywhere forming for the round of entertainments. But we have something more to do in this world than the passive employment of being amused. Among all benefactors of the race of man, those well deserve the gratitude of human kind who minister to the independent intellectual formation of character. The book, the magazine, and the journal are benefits which, by their very abundance, seem to be underrated, and are certainly not utilized to anything like their full advantage. It is a flattering and common assumption that Americans are a reading people; but when the results of their reading are looked for, it is somewhat humiliating to discover how superficial is much of the knowledge gained by it.

It is not to be supposed that a newspaper article, or that dissertations in all the newspapers, will make a reality out of this semblance of knowledge. But every man can act for himself. Any man or woman can determine that leisure shall be well spent, and that time shall be found for the culture of the mind. Under favoring circumstances, we can get help from others. But he is best served who serves himself. He only is independent who can vary his social intercourse by the society of books. Reading is a pleasure within the reach of all save the few who cannot read, and those few could find no better employment than learning. It is the best of occupations, and is, withal, the cheapest. In the winter arrangements, a liberal space for reading should be set apart, and something like a regular plan determined on. Yet even desultory reading is better than none. The young, especially, should acquire a habit which will make their homes pleasant, and save them from some temptations to folly, or worse. Of all house furnishing, books pay the best profit. And of all evening entertainments, they furnish that which is the safest to go to bed upon. There follows no morning dullness or headache, no rebuke of conscience, and no beggarly account of empty pockets.—*Philadelphia Ledger.*

Colored Lights for Tableaux.

For winter evening amusements, colored fires are desirable for increasing the scenic effects of tableau exhibitions. A correspondent inquires of the *Western Druggist* if the ingredients which they had previously published were appropriate for inside illuminations, as, for example, at private theatricals, etc. To which the editor replies: No, with one or two exceptions. Colored fires for inside illuminations, or "tableau lights," should contain no ingredients emitting disagreeable or suffocating vapors, nor should they be compounded of too combustible materials, on account of danger from fire.

The following are said to be very satisfactory:

Red.

Shellac	1 oz.	Strontium nitrate	3 oz.

Mix.

Or the following:

Lycopodium	1 oz.	Sacchar. lacti	4 oz.
Strontium nitrate	1 "	Potassium nitrate	12 "

Mix.

Green.

Barium nitrate	9 oz.	Potass. chlorate	4 oz.
Sacchar. lactis	2 "		

Mix.

Yellow.

Sodium oxalate	2¼ oz.	Potass. nitrate	2¾ oz.
Shellac	2¼ "	" chlorate	2¾ "

Mix.

Blue.

Shellac	2 oz.	Copper am. sulph.	5 oz.
Potass. chlorate	4 "		

Mix.

White.

Stearine	1 oz.	Potass. nitrate	4 oz.
Barium carbonate	1 "	" chlorate	12 "
Sacchar. lactis	4 "		

Mix.

In preparing the above, it is essential to observe: 1. That all the ingredients be dry. 2. That each ingredient be reduced to a moderately fine powder, separately 3. That they be mixed very carefully with a spatula upon a piece of paper. 4. That the finished powders be preserved in small paper boxes or cylinders holding not more than four ounces each.

When shellac and stearine are employed, it has been recommended that they be first fused, and the other ingredients be then incorporated in the fused mass when cold, then to be powdered.

LIEUTENANT GREELY believes that there is an ocean 1,500 miles in diameter round about the pole, that never freezes, and conjectures that the Pole itself is the center of an ice-capped land covered with ice from 1,000 to 4,000 feet thick. These conclusfons are rejected by prominent Arctic authorities in England.

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Correspondence.

The New Brooks Comet.

To the Editor of the Scientific American:

On Saturday evening, Dec. 26th, it was my privilege to discover a new comet, low down in the western heavens. It was also independently observed on the following night by Barnard at Nashville. At the time of my discovery it was about five degrees nearly southward of the star Altair in the Eagle. It is quite a bright telescopic comet, of considerable diameter, with a very prominent nucleus. The discovery was verified by an observation at Harvard College Observatory on the 28th inst.

This is the second comet it has been my good fortune to discover during the present year, the date of the former discovery being August 31, 1885.

WILLIAM R. BROOKS.

Red House Observatory, Phelps, N. Y., Dec. 29, 1885.

Dangerously Connected Boilers.

To the Editor of the Scientific American:

You mention a case of the "unexpected" in the SCIENTIFIC AMERICAN of Nov. 28, as follows: "Two steam boilers were set side by side, and connected together at bottom and top, and partly filled with water; when fire was made under them, the water would shift from one to the other." The cause was the *friction* of the steam in passing through the *small steam connection* from the hottest boiler, which pressure pressed the water out of it into the other. I have seen two cases of this kind, and both were remedied by making the connections six inches in diameter instead of two and a half inches on two boilers forty-two inches by sixteen feet long. This shows what appears mysterious to one party is plain to another when seen from the practical side. J. H. B.

Dayton, O., Nov. 30, 1885.

Railway Cross Ties.

To the Editor of the Scientific American:

I have been interested in reading the communication of F. B. Hough in your paper of November 21, in relation to railway cross ties. I also noticed an item from P. Barry, suggesting metallic ties as an imperishable substitute, also suggesting legislation to protect the American forests.

Permit me to say that, after much track walking and observation of condition of wooden cross ties in various stages of decay, the principal cause of their short life is not natural decay, but is decay hastened by frequent laceration and breaking of the wood fiber by the rail spike. The breakage is in every instance from the surface, which is unsheltered from weather and subjected to constant strain from passing trains. Now, experiments in stone and iron ties have been very unsatisfactory; in fact, their impracticability is admitted, for reasons evident to railroad men. The wood tie is at present the "sine qua non."

If any device can be put in use which will make more lasting the service of the wood tie, a great benefit will be conferred upon the public. My observation leads me to estimate that a rail chair which will prevent the mutilation of the tie referred to, and at same time avoid the strain and wave motion imparted to rails by passing trains, will add to the average life of the wood tie nearly 100 per cent, and would at same time decrease the cost of track maintenance—both objects very much to be desired by railway companies.

GEO. H. FORD.

Columbus, O., Dec. 26, 1885.

Right and Left Handed.

To the Editor of the Scientific American:

On page 323 of SCIENTIFIC AMERICAN, of Nov. 21, 1885, appears an explanation of what makes a man right or left handed. I am a locomotive engineer. I fired a locomotive four years before being promoted, and have had probably fifty different men to fire for me in the last ten years. With but one exception they all stood, as I did, on the left side of the tender, taking hold of the top of the scoop shovel with the right hand, the left hand being down near the blade. Those men, excepting the one already mentioned, hold the knife, while eating, with the right hand; they write with the right hand, shake with the right hand, light their pipes and cigars with the right hand, and, like myself, can't understand how it is that they shovel coal and hook their fires *left handed*. Out of the first five hundred men one may meet while out walking, not more than thirty will use their left hands for all ordinary one-handed operations. All the others, and some of those thirty, will shovel, hook, hoe, plane, drive nails, etc., with the right hand, yet, according to the explanation given, they are left handed. It is curious that all men who are really right handed should be said to shovel left handed, and it will take some more elucidation to convince myself and many others that such is the case. In shoveling as I do, and as ninety out of every hundred men that I have seen shovel, the right hand gives the thrust that fills the shovel, guides it in discharging the load, and is always the last hand to let go when done with it; and the short of it is that it is provoking to be called left handed when the right is used for nearly everything.

CHAS. W. NOEL.

Baltimore, Md., Dec. 28, 1885.

The Channelways of New York Harbor.

To the Editor of the Scientific American:

I have read, in your issue of January 2, 1886, the editorial article headed "Improve the Channelways," and I regret to be compelled to notice misleading inaccuracies contained therein. In the first place, the Congressional act which appropriated $200,000 for the improvement of Gedney's Channel, New York Harbor, was silent in regard to the way in which the money should be applied. No system or plan of improvement was suggested or dictated. The proposals, issued in accordance with law, invited feasible plans from responsible contractors. Many proposals were received, and that one which contemplated the use of the hydraulic plow, and which was strongly urged, personally and through the press, by the representatives of some of the steamship companies, was accepted with the view of testing it to the satisfaction of those companies or their representatives, *and with their money*, though the Government had little faith in the efficacy of the project.

It was an experimental plan, and it was thought best, in deference to the expressed wishes of the ship owners, to give it a trial, so as to get rid of it, after failure, once and for all, and to clear the way for other and more assured plans. It *was* tried, under favorable circumstances, and the result proved unsatisfactory to the projectors, as their contract was canceled, and no payment was made to them for the expenses they had incurred.

A second contract has since been made, with another contractor, which provides for the removal *bodily* of the obstructing material, for which payment will be made per cubic yard dredged and removed to a dumping ground in sixteen fathoms of water. The material is heavy shingle, and can be removed, by natural agencies, only after the construction of extended artificial works of contraction. Such works will require large outlays of money, covering long periods of time, if precedents are to govern the future annual appropriations for works of improvement. It was, therefore, deemed most judicious, in the interest of navigation, to apply at once the present appropriation toward the deepening of Gedney's Channel by dredging, in the hope that, when the larger material had been removed from the bar, in that way the currents would reasonably well maintain the improved depth until Congress provided by additional appropriations for the construction of permanent works which would give and maintain increased depths, equal to the most liberal demands of commerce. Up to the present time, *not a single dollar has been paid to any contractor for any work done or attempted to be done under the appropriation for improving Gedney's Channel.*

My personal and careful examination of the material composing the bar enables me to state with great positiveness that no evidences of any city dumping have been found in Gedney's Channel, though I do not doubt that unlawful dumpings of garbage are frequently made upon the adjacent shoals.

There is no ground whatever for the statement, so often repeated, that the depth in Gedney's Channel has been rapidly shoaling during the past ten years. On the contrary, my survey of the Lower Bay in 1884 shows that the existing depth over the bar has never been exceeded at any time in the known history of the harbor, though it cannot be denied that it is inadequate to the wants of the modern iron vessel, whose draught is three feet greater than that of the average vessel of ten or more years ago. There has been no decline in the main channel—it has rather improved in depth; and the complaint of shoal water is made only because the *draught of vessels has been increased.* Over a year ago I put myself on record by recommending that the depth on the bar at low tide should be increased to 30 feet. I still advocate the necessity for that improved depth, not, however, because the channels are shoaling, but because the large ocean carriers demand more water than the average vessel of to-day. If Congress is to be asked to relieve this harbor from the tribute of delays and discomforts now imposed upon it by insufficient depths on the bar, it is not right to misstate the conditions on which the request is made.

G. L. GILLESPIE, *U. S. Engineers.*

Amblystoma vs. Axolotl.

To the Editor of the Scientific American:

I notice in your issue of December 19 some remarks upon the axolotl, and read them with interest. Allow me to make a few remarks upon this subject, which, though they are none of them new, may be of interest in that they reflect the observations of some of our well known authorities upon this same curious subject—the change of axolotl into amblystoma.

Now, a curious feature in the case is this: the axolotl stands at one end of the order *Urodela*, or *salamanders*, and the amblystoma at the other. The question hence arises, As one must necessarily be higher in the scale of being than the other (at least according to the evolutionists), which is the most highly developed?

We are informed by Tenney that "the Siredons have always been regarded with great interest, because they represent, even in their adult form, one of the transient stages of the higher Urodelan batrachians. But, of late, they have become still more interesting from the fact that Professor O. C. Marsh (see *American Journal of Science and Arts*, November, 1868) has discovered that under some circumstances the *Siredon lichenoides, Baird*, wholly abandons the Siredon form, and becomes a genuine *Amblystoma mavortium, Baird.* He adds that "two specimens, most favored in regard to light and warmth, passed apparently through the entire transformation in about twenty days. Others, less favored, took at least twice that time."

Packard tells us that "the most interesting of all the salamanders is the *Amblystoma mavortium*, whose larva is called axolotl, and was originally described as a perennibranchiate amphibian under the name of *Siredon lichenoides, Baird.*"

Many other cases could be cited where the idea prevails that the one is simply a larval stage of the other. Now we have a most curious anomaly, should we accept the hypothesis of axolotl being the true larval stage, of amblystoma the true form and parent, that of the adult form and the larval form living together side by side, the one in the water and the other on land, and going through with complete transformations, yet at the same time breeding and reproducing each his kind independent of the other, and perhaps—some at least—never transforming at all. Where will you find, in the vertebrate kingdom at least, another example of climatic or other suppression of a larval form into a perfect and apparently complete animal, reproducing its kind in security and apparently preference? The most familiar example of development from embryo resembling a perfect animal to the true animal itself is that of the tadpole becoming the frog. Yet the various stages of the tadpole are not permanent, but progressive, and in a few months progress into complete young frogs, which, in the ordinary species, require three years in which to develop before breeding, and in "the tree frog" four years before it begins to reproduce. Packard, who evidently considers this axolotl a true larval form of amblystoma, remarks of the former: "In the axolotl there is a premature development of the reproductive organs." Should these organs show in any way an imperfect or only a partial development, we would have indeed strong evidence that this animal was a true larval stage. Now, the difference in structure between axolotl and amblystoma is perhaps fully as wide as between the tadpole and the frog. Yet in the latter case we know that the one is a larva of the other, and in its larval stage does not propagate. If, now, I am wrong, will somebody correct me? But do any of the vertebrate animals propagate or reproduce, in their larval stage, in as perfect a manner as the axolotl? I fail to recall any such. Should there be no other example of the kind, this larval theory would be alone, and even more extraordinary than the reversion of type theory which has been applied to this case by non-evolutionists: that the axolotl in its restricted location and extent was simply a reversion of the older and earlier geological form of amblystoma. Now, let some one reverse the order, and turn the amblystoma into an axolotl. Is it impossible?

W. A. STEARNS.

Amherst, Mass.

Russian Peat Fuel.

In Russia, on the Northern Railway, the locomotives, hitherto burning wood or coal, are being adapted for peat burning, and the saving is estimated by the directors at fully 50 per cent. The principal market for the fuel is in the Moscow district, where it is becoming increasingly popular at the numerous manufactories to be found there. In many places the peat is cut by hand machines, but these, although cheap and easy to work, have the drawback that the peat cannot be worked below 8 feet, whereas the peat-cutting machines worked by steam power penetrate 20 feet, and reach the lower, denser layers of peat, which, owing to their superior quality, fetch a higher price in the market. Most of the machines in use are manufactured by Maltseff and Shliekhausen, at Moscow, and Shreeve, at Riazan. The newer ones, which contain numerous improvements, turn out 33,000 or 40,000 bricks a day. At present there is reported to be a great want of a peat-cutting machine workable by horses, that would take the place between the ordinary hand cutting machines and those worked by steam. The latter cost about $4,000. There is a demand for a simpler machine, that could be worked by a team of horses. Here is a chance for inventors. Large deposits of peat exist in this country, and many years ago they were considerably worked. But it was found that coal was supplied cheaper than the peat beds could be worked, and hence peat fuel is not at present much used.

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A NOVEL CLOCK.

We take pleasure in presenting to our readers the following description of a differential clock, invented and designed by Mr. H. Conant, of Pawtucket, R. I., and built for him by Messrs. Tiffany & Co., of this city, in their best manner. Fig. 1 is a perspective view of the clock; Fig. 2 is an enlarged view of the dials; Fig. 3 is a front elevation of the works with the dials removed; and Fig. 4 is a side view of the diagonal shafts, *a* and *b*, and the differential motion; similar letters refer to the same parts in the different engravings.

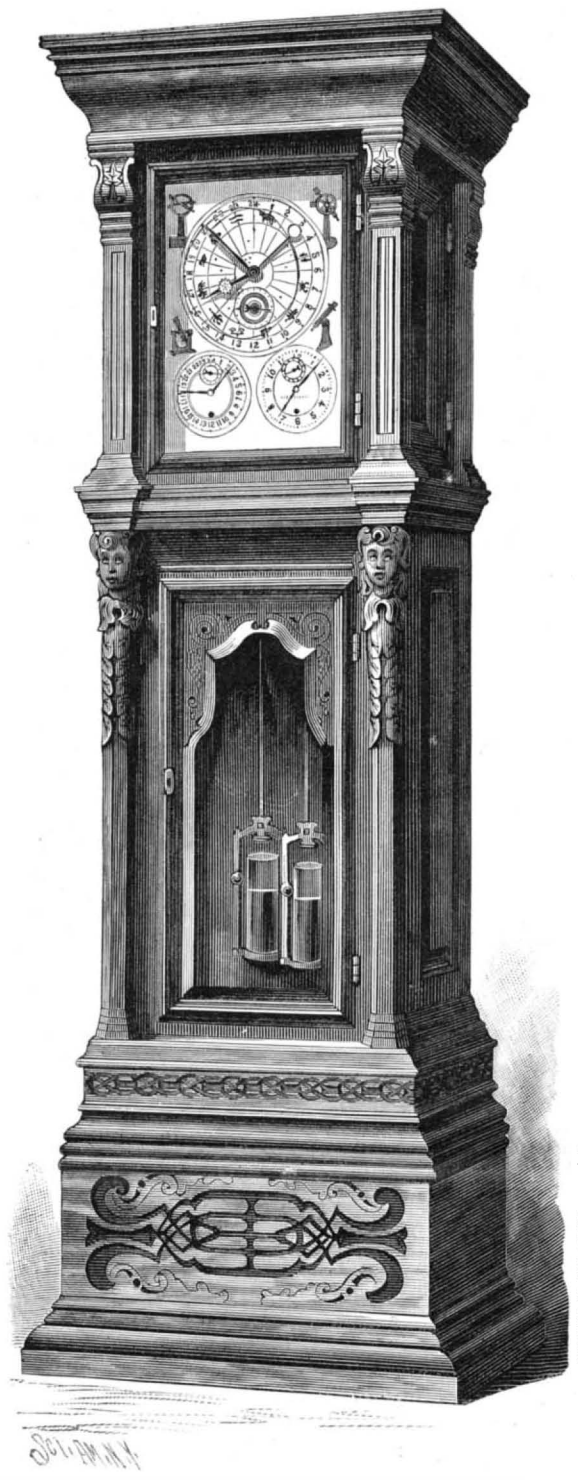

Fig. 1.—THE CONANT DIFFERENTIAL CLOCK.

There are two principal motions that belong to our planet—one of rotation upon its axis, called its diurnal motion, producing succession of day and night, and another, that of its orbit, or revolution round the sun, called its annual motion, which causes the four seasons of the year. The exact time occupied by its first, the diurnal, rotation is 23 hours 56 minutes and 4·09 seconds, this being a sidereal day, so called, because in that time the stars appear to complete one revolution round the earth. But as, while the earth is rotating on its own axis, it is also traveling forward in its orbit around the sun, it therefore has to turn a little more each day—about one three hundred and sixty-fifth part of its circumference, which amounts to 3 minutes 56 seconds of time—before a given meridian is again under the sun; in other words, it will require 24 hours on an average through the year for the sun to pass from one meridian of a place to the same meridian again. If this difference in time of the two revolutions be multiplied by 365, which is the number of times a meridian has been brought to the sun during the year, the result would be one sidereal day; consequently, the earth in reality turns on its axis 366 times each year.

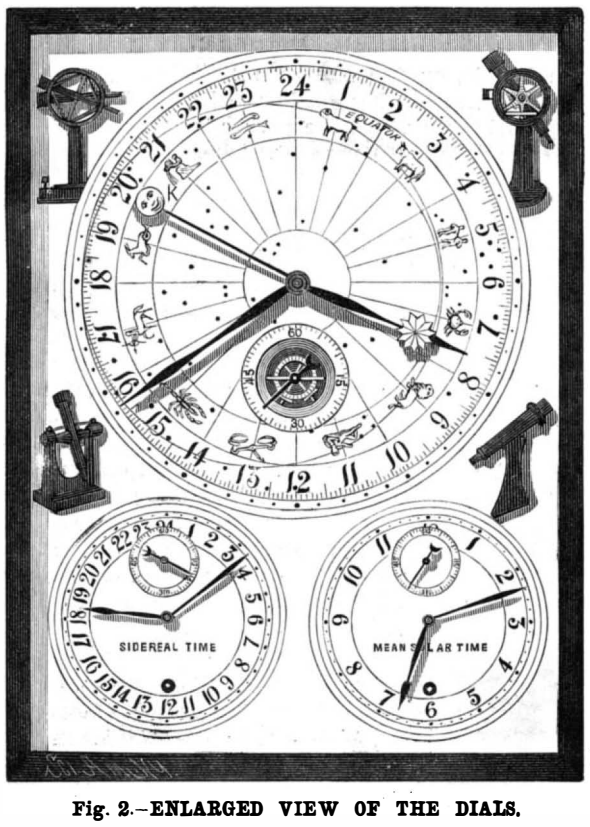

Fig. 2.—ENLARGED VIEW OF THE DIALS.

Now, if a clock were constructed with two works or movements, and, of course, each movement with its own pendulum and weight, one regulated to mark mean solar time and the other to mark sidereal time, it is evident that, as the one would continually gain at the rate of about 3 minutes 56 seconds a day on the other, the time indicated on the two dials would correspond but once in a year; and if this difference in time of the two dials could be automatically recorded on a third dial, it would mark the space which, in consequence of the earth's motion, the sun appears to describe among the stars. This great circle of the sun's apparent yearly motion is divided into twenty-four meridians, and is called right ascension, that measure in the heavens which is the same to the astronomer as longitude is to the navigator. These meridians are not reckoned in degrees, but in hours, minutes, and seconds of time; thus 15 deg. would answer to 1 hour, 1 deg. to 4 minutes, ½ deg. to 2 minutes, and ¼ deg. to 1 minute.

The clock herewith illustrated accomplishes this object by a most simple and ingenious arrangement of the parts.

Firmly secured on a solid base of metal are two regulators, each having a one-second mercurial pendulum. One of the pendulums is regulated to mean solar time and the other to sidereal time, the dial of the latter being divided into 24 hours and that of the former into 12 hours. The escape wheel shaft of each clock is long enough to reach out through the dial plate, and on the outer part is fitted, with a slight friction, a sleeve. On the inner ends of these sleeves are the beveled wheels, *c d*, of 90 teeth each, and their outer ends carry pointers indicating seconds on the dial plates. Engaging with these wheels are beveled pinions, of 30 teeth each, mounted on the lower ends of the long shafts, *a b*, which are carried up at an angle of about 45 deg. and connected with a differential motion (Fig. 4) controlling the works and hands of a larger dial placed above the two others. This peculiar motion is constructed of a light and accurately turned arbor or shaft, *h*, on which is fastened at right angles a crosspiece, on one end of which is mounted the wheel, *g*. On the shaft, *h*, and engaging with the wheel, *g*, are two larger wheels, *e f*, of 90 teeth each; these wheels are cut on both sides, as clearly shown in Fig. 4. Engaging with these wheels are wheels of 60 teeth each, fastened on the upper ends of the shafts, *a b*. It will be seen that both clocks are directly connected with the differential motion, and also that as long as the wheels, *e f*, which turn in opposite directions, are driven at the same speed, the wheel, *g*, will simply roll on its pivot without altering its position or that of the shaft, *h*. But assuming that the wheel, *f*, revolves twice around while the wheel, *e*, revolves once, then the wheel, *g*, will necessarily follow *f*, and in proportion to the speed of the two wheels, *e f*; but as these wheels move in opposite directions, it consequently follows that one-half the difference in the rates is lost, or instead of making a complete revolution—the difference between 1 and 2—it has only recorded half a revolution.

Now, to compensate for this error—in other words, to regain the half revolution lost—the wheels on the upper ends of the shafts, *a b*, have 60 teeth each, and the pinions at the lower ends have 30 teeth each; and as the driving wheels, *c d*, having 90 teeth each, are connected through the pinions, shafts *a b*, and upper wheels with the wheels, *e f*, also of 90 teeth,

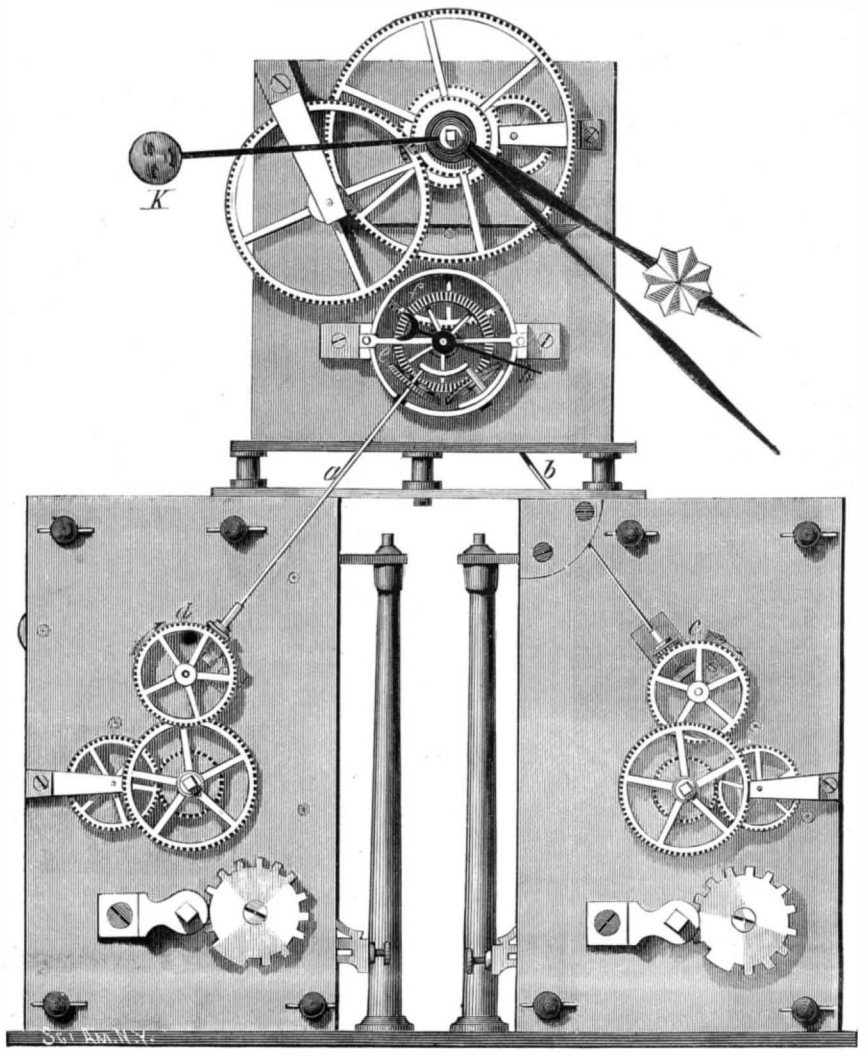

Fig. 3.—VIEW OF WORKS WITH DIALS REMOVED.

it is evident that the wheels, *e f*, revolve twice while the wheels, *c d*, revolve once. By thus proportioning the gears, the exact difference in the speeds of the wheels *c d*, is transmitted to the shaft, *h*, and is recorded by the pointer or hand.

Now, as the clock marking sidereal time gains at the rate of about 4 minutes in 24 hours, or 10 seconds in 1 hour, and as 10 seconds is one-sixth of a minute, it will take 6 hours to complete one revolution of the hand on the differential motion, which is the period of 1 minute in right ascension; 15 days 6 hours is 1 hour, and 1 year is 24 hours in the same measure. The hour hand on the large dial therefore represents the sun's apparent yearly motion among the stars.

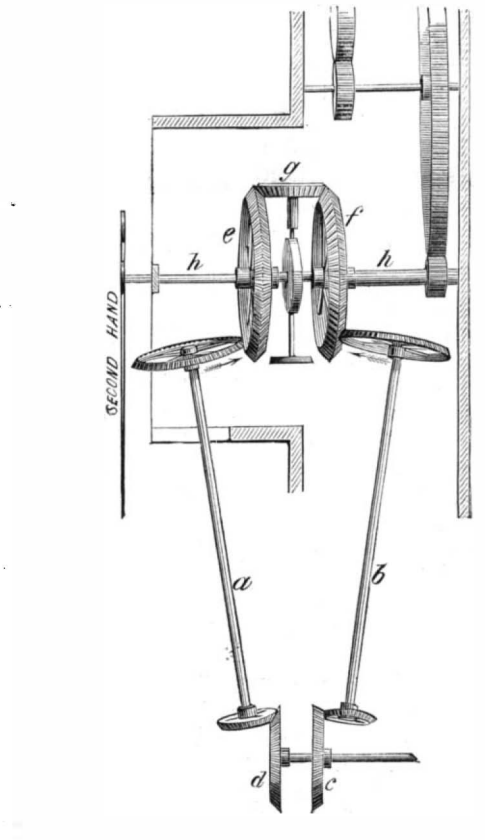

Fig. 4.—SIDE VIEW OF THE DIFFERENTIAL MOTION.

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Another hand, *k*, representing the moon, and making exactly one revolution from one new moon to the next following, has been added.

The hour and minute hands of the different dials are independent of each other, so that one set of hands may be set, if necessary, without affecting the others; but, as has been already said in describing the differential motion, the second hands are connected, so that if either of the clocks should vary one way or the other, the seconds of right ascension would also be affected. In that case it is simply necessary to correct the second hand of that particular clock, when the seconds of right ascension are thereby also corrected.

The shaft, *h*, carries the second hand of the large dial, and from it an ordinary train of wheels gives minutes and hours; when the hour hand passes entirely around the dial, it indicates that the sun has passed through all the hours of right ascension, and a year of time has been exactly measured off. The hand representing approximately the moon's mean right ascension revolves 254 times in 19 years, or a lunar cycle, and passes the sun 235 times in the same period, making that number of lunations. The large dial also represents that portion of the heavens traversed by the sun and all north of the same, the center being the north pole. A number of the most useful and best known fixed stars are engraved thereon, with their names affixed. The eccentric circle represents the ecliptic; the equator and northern and southern Arctic circles are concentric, the latter being the outer one. The sun touches the outer circle on the 21st of December (the winter solstice) and the inner or northern circle on the 21st of June (the summer solstice). It passes the 24th hour of right ascension and crosses the equator on March 21, or vernal equinox, and at the 12th hour of right ascension it again crosses the equator, on September 21, the autumnal equinox. The signs of the zodiac are also engraved on the dial in their proper positions, as shown in Fig. 2.

The name differential is applied to this clock because the hands of the large dial are indebted for their motion to the difference of speed in the two separate clock movements, the mean right ascension of the sun being always the difference between mean solar and sidereal time; and the inventor's theory is that, starting the hands at zero or 24 o'clock, regulating one to sidereal and one to solar time, they will come together again at the end of the year, that is, the hands of the large dial will have made a complete revolution, and the solar clock will give the exact time to a second when the year is completed, or any portion of the year.

This clock is intended for the Observatory at Dudley, Mass., connected with Nichols Academy, where it will probably be placed the coming season.

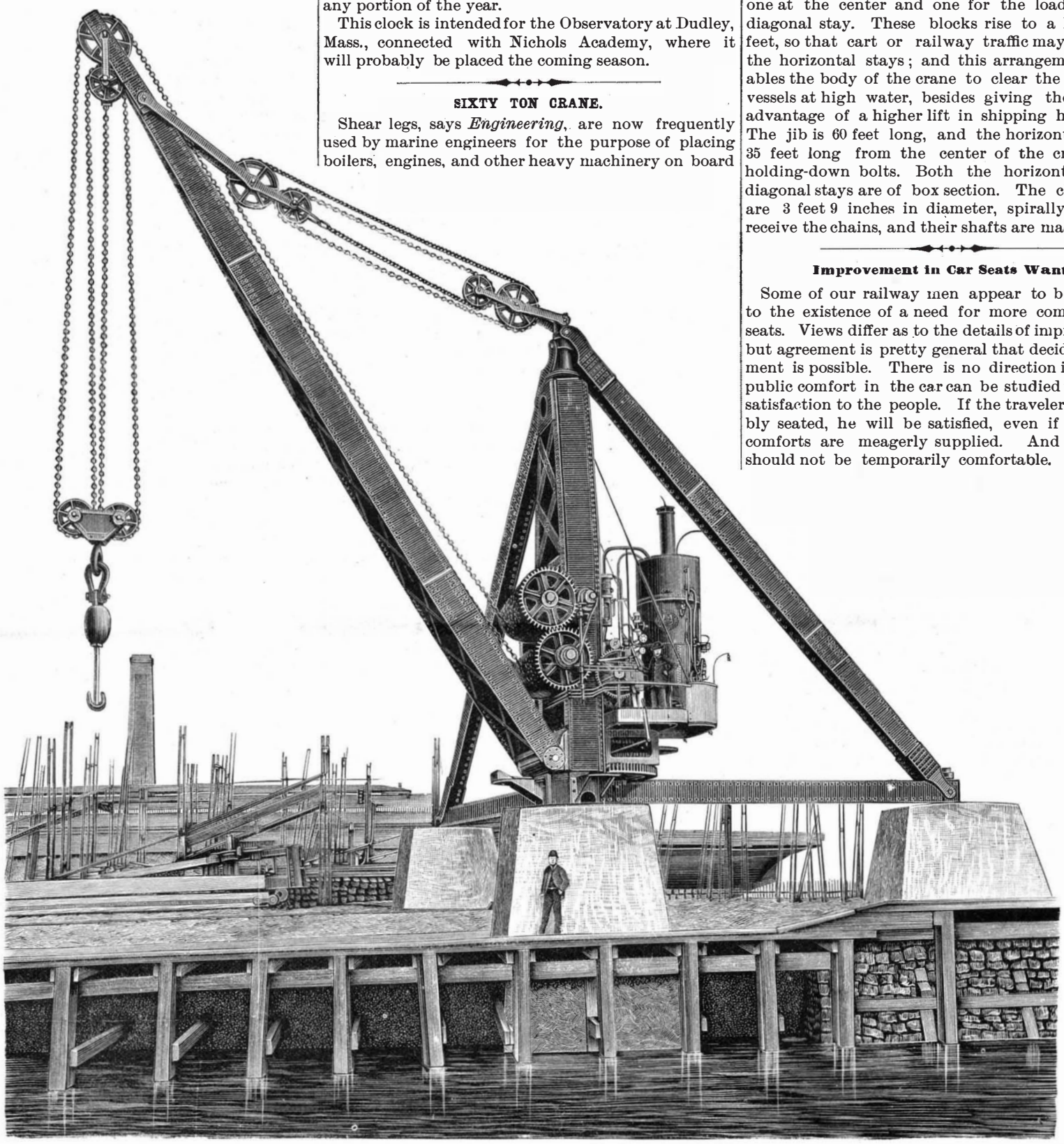
SIXTY TON CRANE.

Shear legs, says *Engineering*, are now frequently used by marine engineers for the purpose of placing boilers, engines, and other heavy machinery on board large steamers; but inasmuch as their motions are restricted to two, their usefulness is also limited. The motions referred to are hoisting or lowering and traveling outward or inward in a straight line at right angles to the wharf on which the shear legs are erected. When a boiler or piece of machinery is to be shipped, it must be brought under the lifting block. It is then raised and projected outward until it hangs directly over the vessel, which is itself then moved forward or aft, so that the object that is being dealt with may be lowered into its exact position. It will thus be seen that shear legs of themselves only cover a line, though by moving the vessel they can be made to cover an area.

Cranes having a fixed radius of jib are sometimes used for similar purposes, and such cranes have a slight advantage over shear legs, as the boilers and pieces of machinery may be deposited upon the quay or wharf under the range of the jib, ready to be lifted on board; but in this case also a line only is covered—the only difference being that it is circular instead of straight, and the vessel must be moved forward or aft when the loads are being lowered to their respective places, just in the same way as when shear legs are being used.

A crane such as we illustrate herewith is free from these defects. The jib rises and falls by power, and thus secures the covering of a large area. Boilers or other loads may be stored all round the wharf, and, by adjusting the jib radius, may be placed exactly in position on board the vessel, which remains moored, or may even be aground.

The crane now illustrated was constructed by Messrs. George Russell & Co., and has been placed on the wharf in the works of Messrs. D. J. Dunlop & Co., engineers and shipbuilders, Port Glasgow. Its working load is 60 tons, lifted at a radius of 35 feet. The foundation consists of three concrete blocks—one at the center and one for the loading of each diagonal stay. These blocks rise to a height of 14 feet, so that cart or railway traffic may pass under the horizontal stays; and this arrangement also enables the body of the crane to clear the gunwales of vessels at high water, besides giving the additional advantage of a higher lift in shipping heavy masts. The jib is 60 feet long, and the horizontal stays are 35 feet long from the center of the crane to the holding-down bolts. Both the horizontal and the diagonal stays are of box section. The chain barrels are 3 feet 9 inches in diameter, spirally grooved to receive the chains, and their shafts are made of steel.



IMPROVED SIXTY TON STEAM DERRICK CRANE.

Improvement in Car Seats Wanted.

Some of our railway men appear to be awakening to the existence of a need for more comfortable car seats. Views differ as to the details of improved forms, but agreement is pretty general that decided improvement is possible. There is no direction in which the public comfort in the car can be studied with greater satisfaction to the people. If the traveler is comfortably seated, he will be satisfied, even if some other comforts are meagerly supplied. And the seating should not be temporarily comfortable. A seat may be so constructed as to look inviting and luxuriously easy, and so as to be really easy for a while, but its lines may yet be such as make it very wearying when it is occupied for any length of time. The limitations in the way of the designer are not to be lightly dismissed. He must make his seat reversible, which fact bothers him not a little. He must be economical of space, and must study conditions of cleanliness in both the seat and the car. Cheapness of construction and strength must also not be lost sight of. But with all these it is yet not an insurmountable task to design a seat that will be very much more comfortable than the majority of those now in use, and we are glad to see that efforts are being made to obtain such a seat.—*The Railway Review.*

ONE of our contemporaries reports that Isabella, ex-Queen of Spain, is not only an owner of considerable real estate in Philadelphia, but is a shareholder in the Keely motor. From the same source we learn that the Motor Keely promises positively to mote very soon, but it begins to be believed that his mote is the much-quoted one which is all in his eye.

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Hydrophobia Can be Cured.

If there are occasions in which the people should be taught what to do in emergencies, poisoning is one instance; and the dread disease hydrophobia is an instance of poisoning at once so peculiar, so subtle, and so generally fatal that the profession, who may only encounter it once or twice in a lifetime, and the citizen who may be far removed from a physician or druggist, should both know that, properly treated, it need not be fatal to human life, and that in more ways than one can immunity be gained. Let one thing more be understood—no quack nostrum and no "secret remedy" will be the subject of reference in this article; nor is it the purpose of the writer to take up medical terms or an analysis of causes or effects, but to put in a clearly stated way certain facts with reference to "rabies," "canine madness," or hydrophobia into plain language, so that if, by unfortunate contact, either child or man shall be bitten, the correct means may be taken to neutralize the inoculated poison, by certain and simple methods, at the earliest moment, and not wait for development and the fearful scenes so often looked upon by the physician (in the past), who has, as a rule, been completely helpless.

The clothing upon the human subject may prevent inoculation, and it *may not;* cases have been known where only a grazing of the skin has been observed, which has conveyed the poison as effectively as a dozen incisions or punctures could have done it, and in due time the person so slightly wounded died in spasms.

Cauterization of the wound *at once*, whether it be deep or shallow, even if only a graze, should be accomplished with the least delay, first washing the wound with a solution of salicylic acid, or with a saturated solution of permanganate of potash, or a solution of aqua ammonia and water, or carbolic acid and water, and then well dried with a sponge; then cauterize—and the average man need not be told that cauterize means "burn." The physician will use caustic potassa; but if the physician cannot be had, any person can wash out the wound as above, and then use a cherry-hot iron, carefully touching every part of the wound. Time is the important element, and human life "the stake." As soon as this is done, get anything possible that will maintain suppuration, or what people know as a running sore, and this should be kept up for five or six weeks, meantime cauterizing about once a week; but the utmost care should be taken to destroy all the bandages and the matter upon them, for inoculation of a dog or cat with the matter discharged from such a wound has produced the hydrophobia in from 16 to 50 hours. Hardly any case is likely to occur where a physician cannot be had in an hour or two, but let prompt means be taken, and make sure at every step.

Several drugs and plants have in years past been claimed as specifics for this dread affliction. There are two positive cures now known, and records prove that both have been relied upon by different physicians, and in different countries, with success.

If cauterization has been carefully attended to, the Turkish bath every second day has completely eliminated the poison; and a French physician, Dr. Buisson, some eighteen years ago, had an opportunity to try the vapor bath, on his own person, and was successful, yet the bath has not had credit for all it has done or might do, if we judge by accessible records,

In 1878, a remedy which has proved its efficacy was first brought to the notice of physicians in a general way, although known limitedly before, and it has continued to be not only available (for Parke, Davis & Co., of Detroit and New York, prepare it regularly), but reliable. It has been used in New York State, and the writer is not positive but in the city of New York.

The remedy is, to the writer's knowledge, in use in New Granada and Guatemala, as a positive remedy for the bites of a number of varieties of poisonous snakes, as well as scorpions, tarantulas, and other reptiles or animals; and such reliance is placed upon this remedy that the natives will not go upon hunting or exploring expeditions without they are first supplied. The remedy referred to is the seeds of a small tree of the order *Simarubœa*, indigenous to Granada, Guatemala, and Mexico. The seed are known as *cedron seed*, and the tree as Simaba cedron. A fruit with a single seed like the peach or olive is grown, and the seed is from an inch to one and a half inches in length, four-fifths of an inch in width or more, and half an inch in thickness; flat or concave on one side and convex on the other; hard, and when cut with a knife shows almost a metallic luster; very bitter indeed. The natives cut the seed and chew pieces, when bitten by snakes or tarantulas, and place the fragments upon the wound, and chew and swallow pieces of the bean. Sometimes, if spirits are available, they dip slices or chips of the bean in brandy, whisky, or other spirits, and then wash the wound, swallowing meanwhile other portions. When thus armed with the cedron seeds, they have a reliable antidote, and seemingly do not care much about a snake bite, if only the cedron seeds are at hand.

On the Pacific coast the virtues of the cedron seed have been proved as an antidote for the bites of the several species of the *Crotalus*, or rattlesnake, family, that abound there, and the hunters and trappers are familiar with the virtues of the seed, and almost implicit confidence is placed in them.

The cedron seed have succeeded in hydrophobia, after all other remedies had failed to allay the spasms in the third stage; and the fluid extract of cedron seed has proved a complete remedy in not only a single case, but in other cases noted and recorded. The remedy has been used by a physician in New York, whose name cannot be cited at the moment of writing, who, called in consultation, gave cedron seed extract, after a lady was so nearly unconscious, and in spasms, that hypodermic injection was resorted to; and in less than half an hour she had stopped barking, whining, came out of the spasms, and a complete recovery was effected. Other cases are on record and can be verified, and such being the case, it seems that the fact should be spread broadcast, that the lives of those who may be inoculated shall not be sacrificed for lack of knowledge that a remedy exists.

The cedron seed has also other medical properties which need not be here discussed. The analysis of the seed has not, so far as the writer is aware, been made, but it is a somewhat curious fact that cedron seed should be so completely an antidote to the rattlesnake poison, which contains formic acid, and also for the specific virus of the rabid dog, wolf, cat, fox, or other animal, and is practically the first really reliable cure of rabies known.

The writer's attention was first called to this remedy in 1879 by a letter from a medical friend then in Guatemala, and since that date by cases in which the remedy has been completely successful, and also to the record of cases reported in which the same remedy has been made use of with the most gratifying success.

The cedron seed proves to be an arterial excitant, and effectively overcomes the sedative power of the injected poison from the fangs of the rattlesnake, which is so thoroughly put into circulation when a human being is struck, and which operates so speedily; while in the case of the graze or bite of the rabid dog, more time is required for the virus to operate on the system, owing partly to the fact of its ineffective induction.

Whatever serves to throw any protection around human life should be understood by the greatest number of the people, especially in a country so overrun with worse than worthless curs as our own, and where no one is safe from their attacks.

THOMAS PRAY, JR.

New York, Dec. 15, 1885.

Saving a Life by Telegraph.

A number of the operators in the main office of the Western Union Telegraph Company at New York are graduates in medicine or medical students who are thus working their way through college. Occasionally they have an opportunity to use their knowledge to good advantage. It recently happened that one of them had his attention attracted by a somewhat unusual message that was being clicked out from an instrument at Big Indian, near Kingston, N. Y. It stated that a certain physician at Pine Hill, three miles distant, was wanted immediately to attend a young person who had just swallowed an ounce of laudanum. The student-operator asked at once for all the particulars, and on receiving them a consultation was held at the New York office. It was decided that it would be hazardous to postpone treatment until the doctor could be found and driven three miles to attend a patient in so dangerous a condition.

The council therefore telegraphed the operator at Big Indian to see that the prescription which they sent was carried out immediately. They prescribed that powerful emetics should be administered, suggesting home made ones, such as lukewarm water and mustard and water, after which the patient was to be vigorously rubbed and whipped with switches to prevent sleep. This unexpected order was faithfully carried out, and with such happy results that the poison failed to act. The physician arrived an hour later, but his attendance would have been useless had the precious interval been wasted. Few more curious instances of frustrated suicide could be cited out of the entire library of fiction.

Dot your I's and Cross your T's.

What the compositor asks (but at present cannot obtain) is, not that the *n* and *u* be made alike, but that each have its distinctive shape; not that the *t* be made similar to *l*, but that it be crossed, or else formed after the fashion much in vogue, namely, a stroke more or less sloping, with a loop in the center on the side farthest from the letter following it; and lastly, that the *i* be dotted, an omission which seems to meet with great favor among authors, though it is very tantalizing to the compositor, since in bad manuscript the undotted *i* may be taken to represent either *c*, *e*, or *r*, or even be supposed to form part of what in reality is the letter *m*. But if the *i's* were dotted and the *t's* crossed, few complaints would emanate from printing offices, or, indeed, ever be heard, so great an aid is the due placing of these letter belongings in the task of deciphering.

Central Milk Factories.

The tendency toward industrial centralization for the production of purer articles, and the prevalence of more reasonable prices, is nowhere better illustrated than in the Central Milk Factory at Hanover, as described by Canon Bagot in *The Farmers' Gazette*. The milk supply of the city was formerly in the hands of several small middlemen, who often gave inferior milk, and were inattentive to the proper cleanliness of the cans and vessels employed. Twenty-four farmers in the neighborhood, therefore, formed themselves into a company, for the purpose of erecting a factory, and supplying the city with pure, unadulterated milk and its products. Very stringent rules were drawn up for their self-government, and provided for the proper economic handling of their aggregate supply, enacting at the same time heavy fines from any member who should deliver milk to the factory wanting in the proper amount of fat, adulterated, or taken from diseased animals, or within five days after calving.

These rules have been sufficiently severe to insure the supply of a superior article. The factory is open to the public to see for themselves the scrupulous attention given to cleanliness, and they are even at liberty to inspect the farms from which the milk is brought, and satisfy themselves about the condition and keeping of the animals.

The floors throughout the building are wholly of concrete, and the walls are cemented, having a dado of blue and white enameled tiles. The drainage and ventilation have also received the most careful attention. The factory is divided into three separate departments for milk, butter, and cheese, which have no communication with each other. The milk is received in a main entrance hall, where it is poured into a large receptacle, holding 90 gallons, on a weighing scale, and the weight automatically recorded. The milk is then run off in an open gutter to the various tanks, either for delivery or for separation. All of these tanks are surrounded by cold water jackets. The milk for separation is heated to 90° F., and the cream separated by means of mechanical apparatus. After ripening, the cream is churned, and the milk is taken out of the butter by a mechanical worker, washing with water being entirely avoided. The separated milk is heated to 158° F. to destroy any animalcules, and is then cooled by passing through tubular refrigerators. After this treatment the milk will keep sweet for two or three days. The greater part of it is now used for cheese making, but it is hoped that when the superior quality of the separated milk becomes better known and appreciated, it will all be sold in the city, and the cheese department will be given up. The opinion seems to prevail that separated milk contains little nourishment, but this is really not the case. Good whole milk, when fresh, contains 87½ per cent of water and 12½ per cent of solids, divided as follows:

Butter fat	3	per cent.
Casein and albumen	4½	"
Milk sugar	4½	"
Inorganic, including phosphorus	½	"

The only constituent the separator removes is the butter fat, leaving all the nourishing qualities of the whole milk. As the fat in cow's milk is largely in excess of that in human milk, fresh separated milk is safer to give to infants than the whole milk. By the addition of milk sugar, it is the best possible substitute for human milk.

Cleanliness has a money value in the dairy business, as has been shown in the success of the famous Darlington Dairy near Philadelphia and the Litchfield Farms in Connecticut. At Hanover this point is always kept in sight. All cans are first cleaned with soda and water, a jet of steam is then passed into them, and finally they are rinsed thoroughly with cold water and allowed to dry in the open air. From the time the milk enters the factory until its exit, in its various forms, no hand is allowed to touch it, the whole process of working and conveyance being mechanical and automatic. The company is its own distributer, and the same scrupulous care is given to the products while in transit, so that they shall be delivered clean and pure. Tickets for eight gallons or upward of whole or separated milk are sold at a reduction of five per cent, which with the superiority of the company's products has insured its commercial success.

About 2,000 gallons of milk are received daily, and handled at a cost of about two and a half cents a gallon. The capital invested in the enterprise is about $30,000, and the annual expense, including interest and depreciation on stock and plant, amounts to $20,000. Canon Bagot suggests that the advantages of such central factories can be made mutual. When managed as well as that at Hanover, the farmer can reach his customers at less expense than when dependent upon the indifferent services of the ordinary middleman, while the consumers are better served, and receive a purer and more wholesome article. He also urges that when the virtues of separated milk become known and appreciated, it may be used to good advantage in the cause of temperance reform, as it offers a beverage at once cheap, nourishing, and agreeable.

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Cleaning Out Waste Pipes.

The annoyance arising from the stoppage of waste pipes in country houses, although very great, is but a small matter compared with the dangers which may follow obstructed pipes. The "sewer gas," about which so much has been written and which is so justly dreaded, is not, as many suppose, the exclusive product of the sewer. Indeed, the foulest, most dangerous, and deadly gases are not found in the sewers themselves, but in the unventilated waste pipes and those which are in process of being clogged by the foul matters passing through them. Any obstructions in the soil or waste pipes are therefore doubly dangerous, because it may produce an inflow of foul gas into the pipe, even though the entrance to the sewer itself has been entirely cut off.

The question is how to get rid of the accumulations in pipes partly stopped or already closed. Digging up and cleaning out is a costly remedy, often ineffectual by reason of careless workmen. The second is the plumber's force pump, which is usually only a temporary relief. In pipes leading from the house to the cesspool there is a constant accumulation of grease. This enters as a liquid and hardens as the water cools, and is deposited on the bottom and sides of the pipes. As these accumulations increase, the waterway is gradually contracted, till the pipe is closed.

When the pipe is entirely stopped, or allows the water to flow away by drops only, proceed thus: Empty the pipe down to the trap, or as far as practicable, by "mopping up" with a cloth. If water flows very slowly, begin when the pipe has at last emptied itself. Fill the pipe up with potash, crowding it in with a stick. Then pour hot water upon it in a small stream, stopping as soon as the pipe appears to be filled. As the potash dissolves and disappears, add more water. At night a little heap of potash may be placed over the hole, and water enough poured on so that a supply of strong lye will flow into the pipe during the night. Pipes that have been stopped for months may be cleaned out by this method, though it may call for three or four pounds of potash. The crudest kind, however, appears to act as well as the best. If the pipe is partially obstructed, a lump of crude potash should be placed where water will drip slowly upon it and so reach the pipe. It is also well to fill the upper part of the pipe with the potash as before, and allow hot water to trickle upon it. Soda and potash are both used for the purpose of removing greasy obstructions, and the usual method of application is to form a strong lye and pour it into the pipe. It is better to put the potash into the pipe, because the water which it contains, instead of diluting, helps to form the lye. As water comes in contact with the potash it becomes hot, thus aiding in dissolving the grease. Potash, in combination with grease, forms a "soft" or liquid soap, which easily flows away, while the soda makes a hard soap, which, if not dissolved in water, would in itself obstruct the pipe.

When a pipe is once fairly cleaned out, the potash should be used from time to time, in order to dissolve the greasy deposits as they form, and carry them forward to the cesspool or sewer. The potash is very valuable for this purpose, because, in addition to its grease-solving powers, it is exceedingly destructive to all animal and most vegetable matters. The most dangerous and deadly gases appear to come from urinals and wash-basin pipes, these, in many cases, seeming to be more foul than those from water closets. The decay of the soap and animal matter washed from the skin appears to be the sources of the gases. The potash will be effective in keeping these pipes clear, and in this way may lessen the dangers.—*A correspondent in the American Artisan.*

A Method for the Purification of Commercial Carmine.

BY JOHN S. ADRIANCE, A.B., F.C.S.

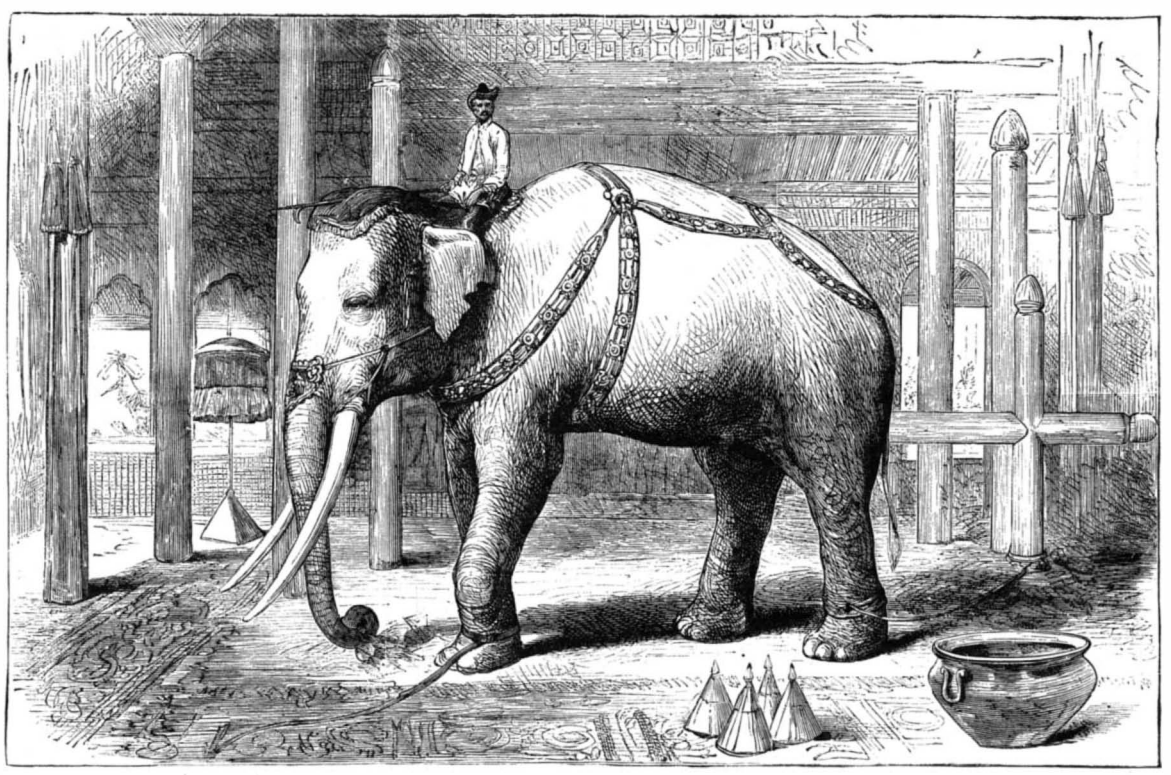
Of all substances used for staining in histological work, carmine is perhaps the most important, but the impure state in which it is sold prevents entire dependence being placed upon it. Commercial carmine contains many impurities and adulterations, more especially fatty matter, tyrosine, talc, carbonate of lead, vermilion, and dust. Pure carminic acid, which is the basis of carmine, is easily soluble in water and alcohol. This is taken advantage of in its purification; very often three-quarters of the commercial article is worthless for coloring. The following method may be found of service:

Extract the carmine with boiling water, washing the residue several times; treat the liquid with lead acetate acidulated with acetic acid until a drop of the solution is colored by hydric sulphide (H_2S). Wash the precipitate by decanting twice, then bring on a filter, decompose with sulphuric acid (H_2SO_4), and filter; repeat this last operation twice, the second time using hydric sulphide (H_2S) instead of sulphuric acid (H_2SO_4). Evaporate to dryness on a water bath, as the acid is decomposed at 136° C., wash with absolute alcohol, and filter; allow the alcohol to evaporate spontaneously, when crystals will be distinctly seen; wash with warm water, filter, and evaporate to dryness over a water bath. Dissolve the residue in ether, and allow the ether to evaporate spontaneously, when crystals of pure carminic acid will appear. Preserve for use in glass stoppered bottles. If your work has been accurate, an alkaline solution of iodine will entirely destroy the color.

BURMAH.

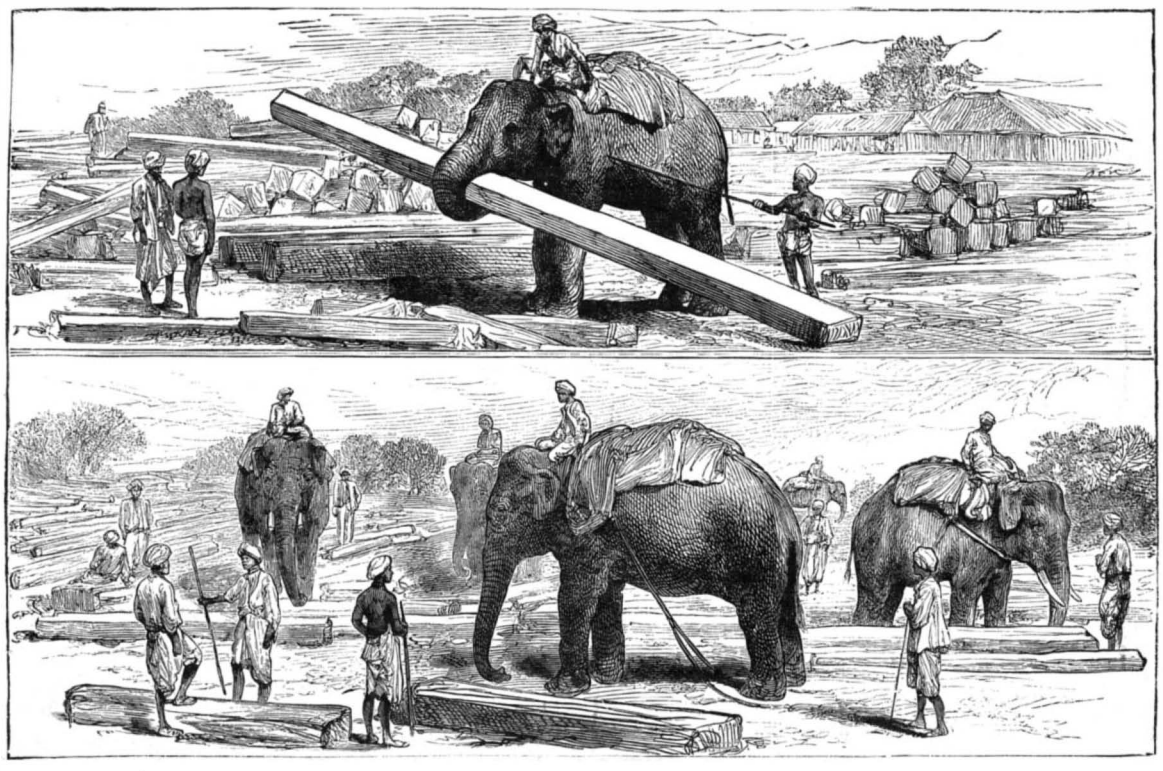
The English possessions in India have lately been augmented by the annexation of the territory of Upper Burmah. The King, Theebaw, managed to get into a dispute with the English, who hold lower Burmah, or that portion bordering on the Indian Ocean, including Rangoon and the mouth of the Irrawaddy River. The result was, the English sent a military force up the river on steamers, and the capital of Upper Burmah, Mandalay, including the King, was soon captured. Burmah is a great place for elephants.

We present illustrations from the *Illustrated London News* of the King's "sacred white elephant" and the employment of working elephants in the removal of teak, which valuable kind of timber, superior to oak for ship building, is one of the most important products of Burmah. It is sent down the river from the forests beyond the British frontier to Rangoon and Moulmein, whence it is mostly exported to British India; and the recent dispute between King Theebaw and the British Commercial Company in his dominions had reference to the cutting of teak.



THE SACRED ELEPHANT OF BURMAH.

Mandalay, the royal city and capital of Upper Burmah, with a population of 100,000, situated on the left bank of the Irrawaddy, is 350 miles above Rangoon. The city and sheltered suburbs measure four miles square. The city is three miles from the banks of the river, and is entirely commanded by the hill, on the top of which is the pagoda. The city proper is within a broad moat, on which King Theebaw had two state barges, and there are five bridges across it. Next to the moat is a high brick loopholed wall, one mile square, on which are forty-eight pagodas, and which is backed by an earth embankment to within six feet of the top. In the center of the city is the palace, occupying a space of a quarter of a mile square, and surrounded by a high stockade and inner wall, with four entrances, and another inner stockade and wall. In the palace yard are the late King's tomb, the Mint, High Court, Tower, with bell and drum, and the celestial elephant. All the buildings, including the palace itself, but excluding the Mint, are gilded, and are of wood or bamboo.



ELEPHANTS CARRYING TEAK TIMBER—BURMAH.

The Treatment of Frost-bitten Fingers and Toes.

Dr. Lapatin, in the *Proceedings of the Caucasian Medical Society*, advises that fingers and toes which have been slightly frost-bitten, and which subsequently suffer from burning, itching, and pricking sensations, should be painted, at first once, and afterward twice a day, with a mixture of dilute nitric acid and peppermint water in equal proportions. After this application has been made for three or four days, the skin becomes darkened and the epidermis is shed, healthy skin appearing under it. The cure is effected in from ten to fourteen days. The author has found this plan very effectual among soldiers, who were unable to wear their boots in consequence of having had frozen feet. They were, in this way, soon rendered capable of returning to duty. —*British Medical Journal.*

THE Rothschilds, it is said, invested 800,000 francs in the experiments of M. Marcel Duprez for transmitting power over long distances by means of electricity. The motive force is conveyed by a comparatively feeble current, thereby doing away with the apprehension of dangerous friction and resistance. Niagara Falls may yet be utilized to operate engines in New York or Philadelphia by electricity.

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ENGINEERING INVENTIONS.

A cable grip has been patented by Mr. Lewis B. White, of New York city. The gripping jaws are on the lower ends of levers operated by a piston working in a cylinder, the piston making the grip take hold on the admission of compressed air to the cylinder, and allowing the hold to be released when the compressed air is permitted to escape.

An apparatus for making steel has been patented by Mr. Alfred Davy, of Sheffield, England. It is arranged for enabling the operation of Bessemer steel making to be carried on in a converter which is portable in the sense of being suspended from a crane or other overhead movable support, and which will answer the double purpose of a foundry ladle and converter.

AGRICULTURAL INVENTIONS.

A stack binder has been patented by Mr. Adolphus J. Laundray, of Clyde, Kan. It is made with a rod having a foot at its lower end, and with arms and a nut and washer, whereby the stack can be compressed by forcing the arms down upon the top, while the ends of the binding arms have sockets to receive poles to hang down along the sides of the stack.

A cultivator has been patented by Mr. Lucian C. Chamberlin, of Lathrop, Mo. It has hinged runners, with rods and levers for adjusting them, a cross bar connecting the beams, having a lever for raising the cutters from the ground, and a rear cross bar having a roller to crush lumps and clods, with other novel features, for cultivating corn and other crops planted in rows or drills, and destroying weeds etc.

A cultivator and harrow recently patented by Mr. Dalton Walls was noticed in the SCIENTIFIC AMERICAN of Dec. 19, but our notice should have stated that the address of the inventor was Appleton City, St. Clair County, Mo.

MISCELLANEOUS INVENTIONS.

An auger has been patented by Mr. George F. Stearns, of Chester, Conn. The blade and shank are made of separate parts joined together, the auger having a steel blade, a wrought steel or iron shank extending to the blade, and a cast worm.

A vehicle wheel has been patented by Mr. James Fishwick, of Mason, O. It has a metal tire, with steel wire spokes, the alternate ones being expanded away from each other at the hub to form two series, which are thrust apart and kept in tension somewhat after the manner of the bicycle wheel.

A cuff adjuster has been patented by Mr. Lucien A. Stillwagon, of Greencastle, Ind. A flat metallic bar forms the body of the adjuster, having at one end a button adapted to enter the button holes of the cuff, and at the opposite end a pivoted spring-acted clamp for receiving the edge of the shirt sleeve.

A butter worker has been patented by Mr. Edward Krueger, of Youngsville, N. Y. The bottom is arranged with the grain of the wood at right angles with the length of the frame, and there are other novel features, whereby the operating mechanism of the machine will not be affected by the swelling and shrinking to the bottom of the tray.

A portable fence has been patented by Mr. Henry W. Butterfield, of Griggsville, Ill. Combined with overlapped ends of the panels and recessed sills supporting them are binding brace wires, so devised as to make a strong and inexpensive fence, which can be readily and quickly set up and taken down and moved from place to place.

A pocket knife has been patented by Mr. Robert G. Hunter, of Palatka, Fla. It has a shoulder formed at the juncture of the back of the blade with the heel, and an open slot leading from the back edge of the heel inward and rearward to the usual pivotal point, so that the blade will be held steadily and firmly, however it may be placed.

A counterboring attachment for bits has been patented by Mr. Edwin F. Lindsey, of Bristol, R. I. The device is calculated to hold adjustably a counterboring or countersinking tool, so that a hole may be bored or drilled and countersunk or counterbored at the same time without removing the bit or drill from the hole.

A lock and latch combined has been patented by Mr. George E. Bower, of Auburn, N. Y. This invention covers a novel construction and combination of parts in a mechanism which may quickly be adjusted to serve either as a lock or latch, providing for varying keys, so that each latch. when adjusted as a lock, can be opened from the outside only by its own key.

A medical compound has been patented by Mr. Charles J. Ulrici, of Havana, Cuba. It consists of pitch deprived of the lighter distillates, such as wood spirit, the acetones, aldehydes, creosote, etc., and combined with glycerine and alcohol, after a certain manner and in special proportions, the compound to be applied externally for sores and skin diseases.

A pulp grinder has been patented by Mr. William Wilkeson, of Youngstown, N. Y. It has a conical running stone rigidly mounted on a vertical shaft, surrounded by an outer running stone with a casing, the ends of which rest on chilled iron balls contained in circular pockets, with other novel features to reduce friction and facilitate the grinding of wood pulp.

A glass tube cutter has been patented by Mr. Samuel G. Lawson, of Portland, Oregon. It consists of two rods pivoted together, with suitable handle, a cutting disk or point being attached to the end of one rod and a gauge plate to the other rod, making a simple device for squaring the ends of glass tubes or cutting rings from long tubes.

An extension table has been patented by Mr. George Schmitt, of New York city. It is so constructed that the table can be extended or contracted without disturbing the people sitting around the middle part or anything that may be thereon, with other novel features to promote simplicity of construction and render such tables less liable to get out of order.

A hop box shade has been patented by Mr. Alfred Engle, of West Amboy, N. Y. It has a folding shade supporting frame carried by a central standard, instead of end standards, being designed to protect the gathered hops and the pickers while at their work, and also to support the hop poles and facilitate the work of picking.

A moulding clamp has been patented by Messrs. Charles A. Phelps and William W. Sterns, of Humboldt, Iowa. It is a novel form of vise for holding the mitered corners of picture frames and other mouldings while being nailed, and keeping them rigidly in a convenient position as desired, leaving the hands of the operator free to more readily do his work.

A hitching device has been patented by Mr. Lewis Lewis, of Ironton, O. It consists of a stock through which passes a sliding rod connected at one end with spring arms and having at the other end an eye, springs being so arranged as to draw the jaws of the arms firmly together, and the device being quickly attached to or detached from the bit ring.

A check rein holder has been patented by Mr. William D. Taber, of Rockville, R. I. Instead of the usual hook a rectangular metallic frame is secured to the saddle carrying a cam-faced clamping tongue loosely mounted, and arranged to closely approach the lower interior surface of the frame, making a device by which the check rein can be quickly adjusted to a proper length.

A fastener for sap bucket covers has been patented by Mr. Burt F. Couch, of Garrettsville, O. It is detachable, and composed of two main parts, a clasp piece and a loop piece, of spring wire or other suitable material, making a hinge designed to project above the edge of the bucket, making a fastening with which the wind will not disturb the cover, and so the stream of sap will not be choked or caused to sputter.

A marine drag has been patented by Mr. William H. Hart, of New York city. It is made with a pyramidal body having a spar attached to one side of its mouth and jointed metal rods to the other sides, ropes or chains from the corners of the mouth of the drag being connected with a hawser from the vessel, and the apex of the drag having a trip line extending along the hawser to facilitate the taking in of the drag.

A window hanging has been patented by Mr. Caleb Dellenbeck, of Portland, Oregon. Combined with a sash is a lug projecting therefrom having projections on its under side, a screw rod passing through an aperture in the lug, a nut with grooves in its top screwed on the rod, and a sash cord connected with the rod, the device facilitating the adjustment of the length of sash cords.

A hinge has been patented by Mr. James W. Whitmore, of Richmond, Va. Its leaves have sockets, one of which is fitted to turn and slide up and down the other, in combination with a screw fitted by a nut in the interior of one socket, and a coupling applied to the other socket, so that the door or gate on which the hinge is used may be made self-closing or not as desired.

A pipe for floorings, ceilings, and other building purposes has been patented by Mr. Ferdinand Ephraim, of San Francisco, Cal. The invention consists of a special construction of iron or other pipes, with a longitudinal tongue on one side and a longitudinal groove or socket on the other side, whereby any number of pipes may be laid parallel and matched or interlocked so as to be self-supporting.

A stop and waste cock has been patented by Mr. Douglas Westervelt, of Chicago, Ill. Its construction is such that the supply and waste ports cannot be opened at the same time, and the latter being below all other pipes, the service pipe and its mechanism may be entirely cleared of water to prevent freezing, the device being especially intended to prevent any possible escape of sewer gas.

A method of transferring patterns for embroidery has been patented by Mr. Heinrich E. Kramer, of Leipsic, Germany. The invention consists in a strip or sheet of paper provided with a layer of starch, upon which the design is printed in one or more colors, the printed matter having a covering of dammar or other gum or varnish, so that the pattern with all its colors can be easily transferred.

A chromatic printing machine has been patented by Mr. Joseph B. Underwood, of Fayetteville, N. C. This invention provides a novel construction whereby, at the same impression, different colored inks may be used on the sheet as desired in different places on the form, and the rollers carrying the different colored inks may be easily adjusted to ink only the places desired.

A breast strap iron has been patented by Mr. Harry Merrymon, of Carbondale, Ill. Its design is such that with it a much shorter breast strap may be used than with common irons with the strap applied in the common way, thus effecting economy in leather, and the iron is given freedom to slide upon the central portion of the strap, so equalizing its wear as to increase its durability.

An ore separator and concentrator has been patented by Mr. Ira F. Monell, of Sugar Loaf, Col. This invention embodies in one machine concentrators which operate in part by concussion, and employ swinging tables and those in which traveling belts are used to facilitate the separation and escape of the tailings, a leading object of the invention being to get rid of the tailings as fast as they collect.

A spring bed has been patented by Messrs. Luther J. Van Delinder and Amasa W. Nash, of Garfield, Iowa. It has a head rest frame in which the longitudinal bars are in line with and have a bearing on the corresponding bars of the main frame, so that less strain is thrown on the side braces, ratchets, and pawl, the rest being easily manipulated by a single attendant, and automatically taking a level position.

An egg timer has been patented by Mr. William H. Silver, of New York city. It consists of a sand glass, with such a support that it may be hung upon the wall of a room, or otherwise conveniently placed, the glass being reversible, and on both ends being marked by a graduated scale indicating minutes and half minutes, and also with letters indicating "hard," "soft," "medium," etc.

A hair clipping machine has been patented by Mr. George F. Sack, of New York city. It is more particularly designed for horse clipping, and has a swiveling connection of the stationary cutting plate and certain connection with its gearing of the reciprocating plate, giving increased facility for operating the machine, and adapting the cutters to work over different parts and in different directions as regards the cut.

A shaving case has been patented by Mr. James H. Flagg, of New York city. It has a main compartment for the razor strop and separate compartments for razor and soap and brush box, arranged upon either or both sides of the main compartment, with flaps for closing the several divisions, so that the whole may be carried conveniently in a traveling bag or in the pocket.

A weather strip has been patented by Mr. William Harrison, of Kingston, Ontario, Canada. It is pivoted, and has a bar projecting upward, with a spring for pressing the strip and bar downward and holding them, a catch on the door frame and a lug on the bar, etc., whereby the weather strip is automatically raised and locked in place when the door is opened and automatically forced down when the door is closed.

A dip net has been patented by Mr. William A. Obenchain, of Bowling Green, Ky. It is formed of four rods united at the ends by joints, netting being secured to the rods, and there being also suspension rods with link joints and netting at the lower ends of these rods, so that the net will adjust itself automatically when resting on the bottom or being raised, and can be compactly folded.

A coffee pot stand has been patented by Mr. Joseph Linders, of Winfield, W. Va. It is so made that the coffee pot will be supported thereby above a drip pan or trough, the pot being placed upon a tilting frame to avoid the trouble and inconvenience of lifting the pot when the coffee is being poured, and there being provision for keeping the coffee hot by the use of a small lamp.

A nut lock has been patented by Mr. John Bare, of Mount Union, Pa. It is for use in connecting sections of railroad rails, and has a T-shaped spring bar, with the cross portion designed to bear beneath two nuts of the fish plate, the stem portion having a bend or set, with a perforation, the bend allowing the stem, when forced down and spiked to the cross tie, to exert an elastic tension against the lower sides of the nuts.

A combined scarf ring, band, and collar stud has been patented by Mr. Henry W. Aberlin, of Bayswater, Middlesex Co., Eng. The clasp is made in two parts hinged together, with a pin or stem affixed to its rear side having lateral lugs, with a collar stud having a pillar of flattened section, with other novel features, whereby the correct position of the band, ring, or clasp, and the necktie, is insured, and there will be no danger of loss of either.

A machine for mending stereotype plates has been patented by Mr. Jacob North, of Lincoln, Neb. This invention covers a novel construction and arrangement of parts whereby the plate will be firmly held while the necessary holes, slots, etc., can be conveniently made for the proper connections, so that the type will fit snugly, and the projecting parts be readily cut off and the plate bushed at each side of the inserted type.

A voltaic battery has been patented by Messrs. Desmond G. Fitz-Gerald, of Brixton, Surrey Co., Eng., and Thomas J. Jones, of Princes St., Hanover Sq., Middlesex Co., Eng. In the negative element, combined with the conductive support and the depolarizing agent, is a waterproof layer containing peroxide of lead interposed between the conductive support and the depolarizing agent, and being in contact on one hand with the support and on the other hand with the depolarizing agent.

NEW BOOKS AND PUBLICATIONS.

LABRADOR: A SKETCH OF ITS PEOPLES, ITS INDUSTRIES, AND ITS NATURAL HISTORY. By W. A. Stearns. Boston: Lee and Shepard, 1884.

Labrador is to most people an undiscovered country. Such vague impressions as one gains from occasional magazine articles are not calculated to induce a desire for further information if it must be gained by personal contact. Yet the journey, when made in a comfortable armchair at home, by means of Mr. Stearns' book, will afford considerable pleasure to those who have a love for traveling and like to know what their neighbors are doing. The unfavorable impression will scarcely be removed, for the bleak headlands and frozen isolation are shown to exist in reality. But the people and their industries will be found to be sufficiently characteristic to attract interest. To students of natural history, the addition to the area of explored nature will prove attractive.

A TEXT-BOOK OF TANNING. By Henry R. Procter. New York and London: E. & F. N. Spon.

The writer of this book has had several years' practical experience in an English sole leather tannery. He has devoted himself more to a consideration of the chemical questions involved in tanning than any other writer upon the subject, except possibly Professor Dussauce, whose book, written some twenty years ago, is now out of print; but Mr. Procter has endeavored to state his views and the results of his experience in such terms as may be readily understood by the average tanner. This is no easy task, considering the difficult nature of the questions involved. The exact differences between tannins obtained from a variety of vegetable substances has never yet been determined, and competent chemists often make quite different figures as the result of analyses for the quantity of tannin in two specimens of the same material. Then, too, the amount of tannin in oak and hemlock bark, in sumac, and in most other tannin producers, varies widely, according to the climate and soil, the age of the plant, and the after curing before the tannin is extracted. These are all questions directly affecting the value of the tanning material, but, this once determined, there are yet more important considerations involved concerning the reactions which take place in the handling of the tan liquor in connection with the hide and skin in the manufacture of leather, and about which the best tanners, as well as the chemists who have studied the question, by no means agree. German and Austrian chemists have given a great deal of attention to the subject for the past ten years, and there are now several technical schools there for the education of young tanners in the chemistry of their business. There is also an effort on foot among the tanners here to employ a chemist to devote himself exclusively to such experiments as the trade may call upon him for, a circumstance which renders this volume especially well timed. In addition to the chemical features, however, the book gives a practical description of the leather manufacture, more particularly as it is carried on in England, and presents many points well worth the attention of American tanners.

ELECTROLYSIS. By Hippolyte Fontaine. Translated by J. A. Berly. New York and London: E. & F. N. Spon.

This book gives a great deal of valuable information relative to the treatment of metals by electricity, including the fullest details yet published of the best French practice in nickeling, coppering, gilding, silvering, and the refining of metals and treatment of ores. The department of electroplating is presented with great thoroughness, with illustrations of representative establishments and descriptions in detail of the appliances. In mentioning the fact that, in silver plating, the Messrs. Elkington, of England, and Christofle, of France, have long had a kind of monopoly of the business, the author says that "there are not more than ten factories in Paris where the silver plating business is conducted on a really industrial footing; the small installations do not succeed." It is stated that the Messrs. Christofle annually deposit more than 6,000 kilogrammes of silver (equal to 13,227 pounds avoirdupois) the average thickness of the deposit equaling 300 grammes (10½ ounces avoirdupois) per square meter. The description of the electrical refining of copper and lead includes explanations of the work done at establishments at Hamburg, Frankfort, Marseilles, Birmingham, England, and other places where the work has been done on a large scale.

Business and Personal.

The charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

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For Sale.—Six inch Telescope, equatorial, mounted. John Hammes, Keokuk, Iowa.

The *Socialist*, a monthly magazine, is addressed to progressive men, who are not the slaves of old ideas. Specimen copy gratis. Address *Socialist*, 907 Walnut Street, Philadelphia.

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Inventors having patents of merit for sale, address Chas. Babson, Jr., 24 Congress St., Boston, Mass.

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say their object is simply to retain good men in office when you find them. This theory may be safely applied to the treatment of the human system by means of medicine. Those who have once tried Dr. Pierce's "Golden Medical Discovery" for scrofulous swellings and sores, loss of flesh and appetite, weak lungs, spitting of blood, and consumption, will apply to it the real principle of Civil Service Reform, and "hold fast to that which is good."

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If an invention has not been patented in the United States for more than one year, it may still be patented in Canada. Cost for Canadian patent, $40. Various other foreign patents may also be obtained. For instructions address Munn & Co., SCIENTIFIC AMERICAN patent agency, 361 Broadway, New York.

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Curtis Pressure Regulator and Steam Trap. See p. 350.

Woodw'kg. Mch'y, Engines, and Boilers. Most complete stock in U. S. Prices to meet times. Forsaith M. Co., Manchester, N. H.

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Friction Clutch Pulleys. D. Frisbie & Co., Phila.

Tight and Slack Barrel Machinery a specialty. John Greenwood & Co., Rochester, N.Y. See illus. adv., p. 414.

English tanned Walrus Leather, Sea Lion, Oak, and Bull Neck Leather for Polishing. Greene, Tweed & Co., New York.

Magic Lanterns and Stereopticons of all kinds and prices. Views illustrating every subject for public exhibitions, Sunday schools, colleges, and home entertainment. 136 page illustrated catalogue free. McAllister, Manufacturing Optician, 49 Nassau St., New York.

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Notes & Queries

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters, or no attention will be paid thereto. This is for our information, and not for publication.
References to former articles or answers should give date of paper and page or number of question.
Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all, either by letter or in this department, each must take his turn.
Special Written Information on matters of personal rather than general interest, cannot be expected without remuneration.
Scientific American Supplements referred to may be had at the office. Price 10 cents each.
Minerals sent for examination should be distinctly marked or labeled.

(1) E. D. M. writes: I have two telegraph instruments on same line, one 20 ohms resistance the other 6; why won't they work? Which is the best kind of battery to use on a short indoors line? In electrotyping with plaster of Paris, is any preparation put on the type or on the plaster, and is the common (commercial) plaster used? To what consistency should the plaster be mixed before pouring upon the type? Is crude or vulcanized rubber used in making rubber stamps? A. You can make your telegraphic instruments work by using sufficient battery power; but you would secure better results, with less battery, by making the resistance of your two instruments alike.—The gravity battery is undoubtedly the best for your purpose.—For moulds for electrotyping you should use the finest plaster of Paris; it is generally mixed up to about the consistency of cream. The mould requires no preparation other than drying.—The best rubber stamps are made by pressing vulcanizable rubber in moulds, and vulcanizing the rubber while in the mould.

(2) H. G. S.—It is entirely impossible to furnish an estimate of the value of a patent. It often happens that a patent which seemingly has no value whatever brings a large price; and, on the other hand, a patent which appears to have great value proves to be profitless. It is almost entirely a question of management.

(3) O. H. H.—Bath tubs are made of tinned copper, and cannot be retinned. Electroplating is not practicable, and would last but a very short time if done. The New York practice is to reline the tub with tinned copper or buy a new tub. We consider the latter the cheaper.

(4) E. F. M. asks what black lead is mixed with to make crucibles. A. Fine clay in quantity as small as will allow the black lead to be worked on a wheel. Clay and black lead should be ground together.

(5) W. K. asks: What substance could be used to render wax (for artificial flowers, etc.) pliable in a cold temperature without altering its whiteness? A. Mix with a small quantity of the oil of sweet almonds.

(6) H. C. P. asks how to make the enamel that is used on brass signs to fill up the letters that are cut in. A. Mix asphaltum, brown japan, and lampblack into a putty-like mass, and then fill in the spaces, and finally clean the edges with turpentine.

(7) J. W.—Most of the alum now sold in this country is made artificially. If a good supply of proper quality could be obtained, it would be marketable. Alum is worth about 2 cents per pound.

(8) H. S. G. asks: How do seedsmen extract seed from tomatoes, and whether any expensive or complicated machinery is required? A. The tomatoes are mashed or broken in a tub or other receptacle, and allowed to stand for a day or two until a slight fermentation has taken place. When this occurs, the seeds can readily be washed out. They may also be saved, when the flesh of the tomatoes is used for canning, by being shaken out after the tomatoes are cut open. The seeds are then scoured by being passed between two large circular brushes running in opposite directions.

(9) K. C. writes: We have here a mountain of plaster and a good many acres of alkali soil. Can this plaster be ground and applied in its raw state to this soil with any benefit, or must it be first burnt and ground before applying? A. It depends upon the character of the soil and also upon the variety of crops that it is desired to raise. Burn and grind before using. 2. Is the ordinary farm plaster advertised at the East burnt and ground? A. It is.

(10) E. V. B. asks: 1. Can a polyopticon be constructed by which a cabinet photo or other like opaque object can be enlarged (with coal oil light) to life size, and a clear-cut image produced, to trace with crayon? A. We think the light of an oil lamp will be insufficient for enlarging pictures in the manner proposed. Better take a negative of the photograph, and enlarge it by means of an oxyhydrogen lantern. 2. Would the same lenses be suitable for a draughtsman's camera? A. Probably the lenses of a polyopticon will answer for a draughtsman's camera. 3. What would be the proper dimensions, etc., and best method of constructing the polyopticon, and where can the proper lenses be procured at reasonable figures? A. See SUPPLEMENT catalogue, which we send you, for mention of articles on the subject. Any of the opticians who advertise in our columns could furnish you with lenses, etc.

(11) B. D.—The floating specks before the eyes, of which you speak, give in some cases indications of serious trouble; but in by far the greater number they are not of special moment. Nothing but an actual and careful examination by a skilled physician can tell to which class your case belongs. To follow directions given by any one else would be, not foolishess, but madness. Never trifle with the eyes. One general remark may be safely made—if the eyesight be unimpaired, the probability is that the specks are produced by nervous derangement only, and may be disregarded.

(12) N. S. McC.—General Winfield Scott died at West Point, N. Y., May 29, 1866.

(13) E. P. A.—To solder cast iron, galvanize the pieces and then flush tin into the joint. Hydrochloric acid, zinc, and sal ammoniac is the proper soldering acid; put water with it to make it less offensive. It will bear diluting for most purposes.

(14) L. L.—Surveys are made by all reputable surveyors in reference to the true meridian. Maps for record have the variation of the compass for the date of the survey marked upon them, and deeds, if properly written, should accord with the map, or the angles should refer to the true meridian. Every resurvey by compass should have the variation of the magnetic needle for its date corrected by the vernier upon the compass. If there is no vernier, then each compass run must be corrected arithmetically from the record of the field book.

(15) P. F. C.—There is no way known to us for removing the spots from a brass chandelier but refinishing. They may be scraped bright and lacquered, but there will still be spots when compared with the regular finish.

(16) G. G. P. asks: What is the best method of stenography in existence? A. Most stenographers think the system they have studied the best. The Graham, Munson, and Pitman systems are all largely used, and the Burnz system, a sort of phonetic simplifying of one of the other more elaborate systems, is also now much used; but to acquire the facility necessary to report a fast speaker requires close application and constant practice for years.

(17) T. H. De S. asks: Will it injure a tin roof or sheet iron to coat it with tar made from pitch pine?—Please explain what becomes of the quantity of water with which cement (hydraulic) is mixed when it sets rapidly. State the chemical change. A. Tar from pine and coal tar from gas works are both in univeral use for painting ironwork. In SCIENTIFIC AMERICAN SUPPLEMENT, No. 386, you will find an interesting paper on the manufacture and composition of Portland cement. The setting of the cement is due to the formation of a hydrate of lime, alumina, and silica, a definite chemical compound, which, when formed, resists further action of water.

(18) A. C. D.—There are a great many receipts afloat for tempering baths, but the best results are from a thorough knowledge of the heat required by the steel, and proper method of dipping to get the best effect. Plain water is used in most of the shops. A little salt, acid, and a variety of chemicals have been suggested by experimenters to give the water a better hold on metallic surface in hardening. Such additions may allow of hardening at a trifling lower temperature, or at a given heat make the article a trifle harder. Still, our best workmen confine themselves to pure water, salt water, and good oil, for hardening the various kinds of steel articles and tools. Borax heated to evaporate its water and pulverized, with one-tenth sal ammoniac, is the best we know of for welding steel. Your pulley should be 50 inches in diameter.

(19) C. D. asks a recipe for some material to put in the seams of a boat which are almost too large for oakum. Also a good paint to paint the hull and bottom? A. We know of nothing better than strips of wood fitted and driven into the seams, with hot pitch. Paint with linseed oil and plumbago or lampblack for priming, and a second coat of any desired color.

(20) F. M. F. asks the best way to get the gold out of rags used in a bindery? A. Burn the rags, collect the ashes, and treat them for gold by the usual method of assayers, *i. e.*, fusing with lead, and cupeling lead button.

(21) W. S. asks how to make a powerful spark coil, not an induction coil, to be used principally for lighting by electricity. I should prefer to have one of good strength, as I will probably use it for other purposes also. I do not exactly know the proper proportions for winding, the size of wire for the core, and also the outside wire. A. For full instructions on the construction of an induction coil, consult SUPPLEMENT, No. 160. If you do not desire it for giving sparks, you might omit the condenser.

(22) J. McV. asks how to polish common cow's horns, and gives them a fine gloss for fancy work? A. First scrape with glass to take off any roughness, then grind some pumicestone to powder, and with a piece of cloth wetted and dipped in the powder rub them until a smooth finish is obtained. Next polish with rottenstone and linseed oil, and finish with dry flour and a piece of clean linen rag. The more rubbing with the stone and oil, the better the finish.

(23) W. M. D. asks where the third man should be placed, so that three men will carry an equal weight of a bar 15 feet long, the other two being placed at the ends. A. One man in center and one man 2½ feet from each end.

(24) Fidelis asks: 1. If there is any cheap way to distill water for home use? A. Water that is first filtered and then boiled is comparatively pure. For the distillation of water a retort and worm are necessary. 2. How walnut water, for the hair can be made? A. See "Walnut Hair Dye," SCIENTIFIC AMERICAN for Oct. 24, 1885. 3. Whether hard or soft water is best for cleaning one's teeth and washing one's hair? A. Preference is generally given to soft water for the purposes mentioned.

(25) H. C. H. asks: What will take grease or oil out of a granite door step? A. Make a strong lye of pearlashes and soft water, and add as much unslaked lime as it will take up; stir it together and then let it settle a few minutes; bottle it and stop close; have ready some water to dilute it when used, and scour the part with it.

(26) J. B. F. asks for the best method of reducing rubber gum to a liquid state. I have used naphtha, but the result seems to be rather slow. A. Rubber is also soluble in ether, chloroform, coal tar benzol, and carbon disulphide. See "Solvents for Rubber," SCIENTIFIC AMERICAN SUPPLEMENT, No. 247.

(27) J. T. R. asks for the correct formula for making a particular "Pearline," a washing compound? A. It is considered to be an impure potassium carbonate or pearlash preparation. An exact analysis of it would cost about $25, depending upon exactly what information is desired, *i. e.*, the percentage of pearlash alone would cost $10.

(28) T. M. D. writes: Please forward me pamphlets which treat about taking out patents, also your pamphlet giving information of foreign patent laws. Please send me your Supplement Catalogue, also your list of scientific books you have for sale. Will you please answer me the following questions through the correspondent's column of the SCIENTIFIC AMERICAN? What will best remove rust from steel? How can you prevent steel from rusting? What is the toughest and most elastic wood obtainable in this country? A. You may remove rust by dipping the articles in a bath of hydrochloric acid 1 part, water 4 parts. A far better process is to polish off the rust with flour emery or emery paper, and then wipe the surface with a solution of paraffine in naphtha or turpentine.—Much depends upon the nature of the articles that are required to be protected from rust. White lead paint thinned with kerosene or lard oil is much used on machinery. Machinery for transportation is painted with white lead or tallow.—Heart hickory and lancewood are the toughest and most elastic woods that we know of.

(29) F. A. T. asks: 1. What causes the current in the Straits of Gibraltar, and is there an outward current? A. The revolution of the earth is supposed to cause the flow of currents in the ocean and the great seas. The Mediterranean Sea is under the same influence, and furnishes several currents out and in through the Straits of Gibraltar. There is an inward surface current and an outward undercurrent, causing other local currents or eddies formed by the impinging of the great currents. 2. What materials and how used to polish shirt bosoms? A. Use a polishing iron, and boil a small piece of paraffine with the starch. 3. What is the title, and where can I obtain a book giving the manners and customs of the people from Adam to the present? A. You will require many books, among which may be mentioned: The Bible; Andrews, The 18th Century, Manners and Customs; John Lord's Works; Lacroix, Manners, Customs, and Dress during the Middle Ages; the histories of Rome, Greece, etc.

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AND EACH BEARING THAT DATE.

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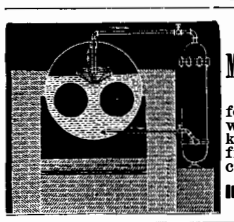

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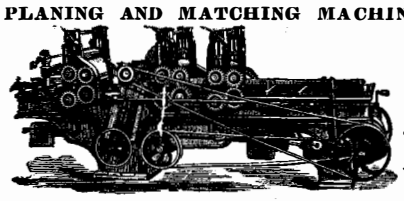

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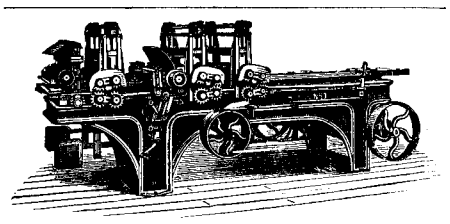
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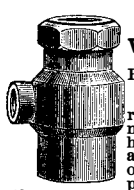
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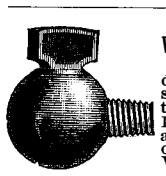
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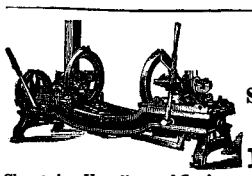
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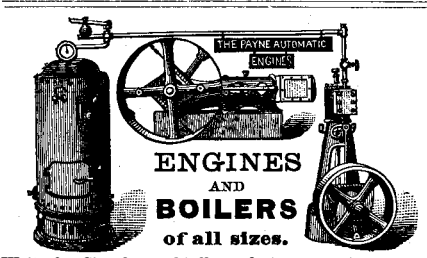

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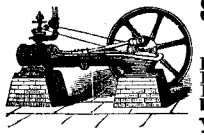

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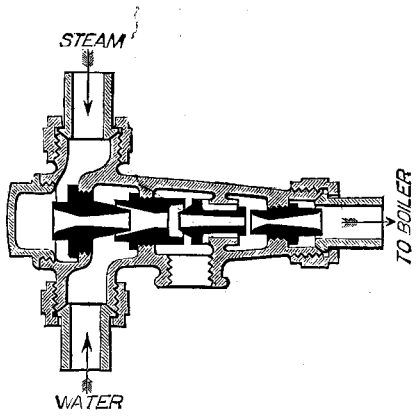

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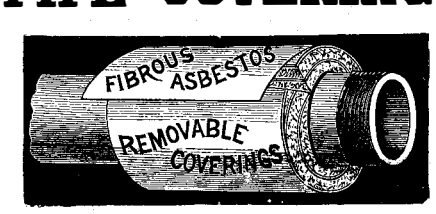

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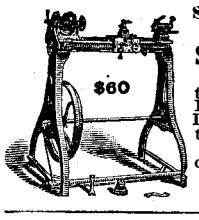

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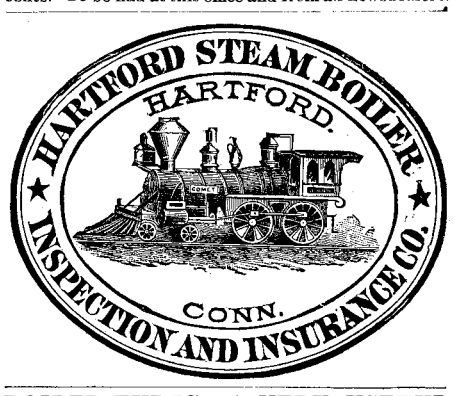

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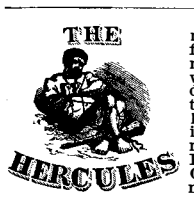

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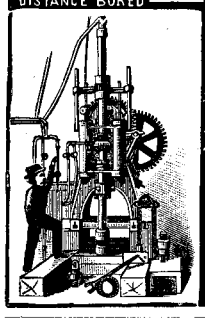

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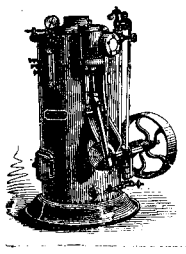

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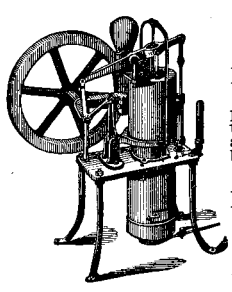

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